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TRACK AND FIELD

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TRACK and FIELD



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TRACK AND FIELD

INTRODUCTORY

For centuries sculptors and poets alike have glorified the fine physiques of track and field athletes. The Greeks considered imperfect physical development a disgrace, consequently every youth sought diligently to develop a beautiful and well proportioned body. In addition, each individual aspired to excel in speed, endurance, and courage. It was only natural, therefore, that aspiring athletes should turn to track and field sports as the media through which these qualities were to be developed.

The high development of track and field athletics in ancient Greece is now being paralleled, and even surpassed, in our present day and age. The present program of events evolved from the English contests which arose during the revival of amateur competition about 1850. The first championship contests conducted in America were conducted in 1876 by the Amateur Athletic Union and the Intercollegiate Association of Amateur Athletes of America. Since that time, several organizations have contributed to the development of the sport by sponsoring meets and formulating rules and policies. Prominent among these is the National Collegiate Athletic Association, the National Federation of State High School Athletic Associations, and countless athletic conferences and playing leagues.

Track and field has held a major place in the sports program of the peoples of the world since the beginning of time. One reason for this is the fact that soon after a human infant learns to move, to crawl, to walk, he takes an interest in running. Jumping soon gains his attention. Throwing, in turn, then begins to appeal. It follows, therefore, that since the events on the track and field program are fundamental movements they soon find their place in the lives of young people.

Values Derived from Track and Field Competition.— What values can be gained from participating in track and field? This is a logical question which every aspiring athlete should ask himself. He should reasonably expect a number of advantages from these activities. Training improves the nervous and muscular control so that co-ordination of the mind and body approaches the optimum. It also increases the efficiency and the range of the adjustments of the

vital organs. Moreover, it increases the capacity to store temporarily and to remove more efficiently large amounts of lactic acid formed. Other advantages include a better appetite, sound sleep and better elimination.

Therefore, from a purely motor standpoint, much can be said about the advantage of participation in track and field. To be of the most value, however, an activity should offer more than motor activity. It must help develop right social attitudes, habits, and knowledges. Any one who has taken part in this popular sport knows of the many opportunities to make friends on the practice fields and in competition. This fact is brought clearly to mind at the major relay meets where the athletes are seen visiting around on the field. They compare notes and form friendships with boys from other parts of the country. The athletes, who are sufficiently gifted to make the Olympic trip, become acquainted with many interesting peoples of strange and distant lands. They gain many advantages which they never anticipated.

There is no opportunity to make a living in track and field activities, since they exist only as amateur sports. Participation in them, therefore, must be in the form of recreation. From the knowledge standpoint there is much to challenge the mind in knowing records, styles of running, pace judgment, and forms in field events. These things are open to both the competitor and to the spectator.

The Variety of Opportunities Offered in Track and Field. —Track and field offers a wide variety of activities. A person lacking the speed for a 60 yard, 100 yard, or 220 yard sprint, may have sufficient endurance and speed for a 440 yard, 880 yard, or one mile run. The boy who is endowed mainly with endurance may choose the two mile or five mile run. The 120 yard high hurdles and 220 low hurdles are form events which offer an opportunity for the long limbed youngster who has several qualifications, such as speed, endurance, spring, and courage. Large men who cannot compete successfully in the running event may find pleasure in the shot or discus. The lighter and faster individuals may succeed in the high jump, broad jump and pole vault. The boy with the strong throwing arm may excel with the javelin. Some persons who are not talented enough for the individual events may find places in one or more of such events as the 440, 880, one mile, two mile, four mile, sprint medley, distance medley and shuttle hurdle relays. The meets between the United States and the British Empire have demonstrated what can be done in the way of combining results of three men in a field meet with one team of three men competing against three men from the other team.

Track and Field Personalities.—In addition to learning of the variety of opportunities in track and field, the aspiring athlete will doubtless be interested in some of the personalities who have helped to develop the sport and keep it alive. The Greeks must be considered first since the early Olympic Games were held as a festival in memory of Olympus Zeus. The ancient games were discontinued because of gambling and professionalism and it was not until 1896, largely through the efforts of Baron Pierre de Courbetin, that they were started again as the Modern Olympics. From that time to the present many persons, both organizers and athletes, might be mentioned as builders of interest in this sport. Competitors who have contributed most as sprinters include Hahn, Paddock, Murchison, Simpson, Drew, Williams, Abrahams, Tolan, Wycoff, Metcalfe, Borah, Scholz, Wefers, Loche, and Owens.

The illustrious list of middle distance runners includes Long, Shepard, Pilgrim, Reidpath, Rudd, Myers, Meredith, Hill, Lowe, Hampson, Lightbody, Hahn, Watson, Cutbill, Helffrich, Holpin, Marsters, Eastman, Wilson, Blake, Conneff, Devaney, Larva, Beccali, Connolly, McCafferty, Kiviat, Roll, Peltzer, Ladownmegue, Bonthron, Edwards, Lermond, Karr, Barbuti, and Phillips. Such world renowned "stars" as Nurmi, Wide, Joie Ray, Venzke, Hahn, Dodge, Martin, and Cunningham should be given credit for making the mile run the most popular event in the Eastern indoor meets such as the Wanamaker Mile, Baxter Mile, Hunter Mile, Prout Mile, Columbian Mile, and Overton Mile. Of these, Nurmi and Cunningham stand at the top.

Nurmi should be named again with Kolehmainen, Ritola, Lash, Lehtinen, Hill, Kusocuiski, Manning, McCluskey, Dawson, Iso Hollo, Loues, Shrubb, Stenroos, El Quafi, and Zabola among the greatest of long distance running.

Among the fine hurdlers are Kraenzlein, Thomson, Kinsey, Hillman, Loomis, Taylor, Burghley, Snyder, Guthrie, Atkinson, Salvig, Hardin, Brookins, Beard, Keller, Gibson, Wells, Anderson, Baskin, Simpson, Werner, Collier, Sentman, Towns, and Allen.

In the past few years much interest has developed in the jumps, particularly the high jump and pole vault. Charley Hoff did much to start the group skyward in the pole vault. Foss, Barnes, Sturdy, Gruber, Warne, Mitler, Gardner, Gilbert, Carr, Meadows, Nishida, Sueo Oe, and Sefton have added to the height of this event.

High jumpers are now going over unbelievable heights. Sweeney, Richards, Horine, Osborn, MacNaughton, Landon, King, Albritton, Thurber, Spitz, Johnson and Marty have all been great high jumpers.

Broad jumpers have continually improved from the time Frazier won this event in the 1876 A. A. U. National Championships with a jump of 17 feet 4 inches until Owens jumped 26 feet 8 $\frac{1}{4}$ inches at Ann Arbor, Michigan, in the summer of 1935. Between these two performances came such jumpers as O'Connor of Ireland, Gutterson, Butler, Gourdin, Hubbard, Hamm, Numbu, Gordon and Cator.

Most of the shot putters have been large strong men. Ralph Rose was the first man to put the 16 pound shot 51 feet. McDonald, Mucks, Hauser, Kuck, Schwarze, Brix, Sexton, Torrance, Zaitz, Francis, and Wollike of Germany, have all had a part in putting the big round ball out farther and farther.

Some of the same names appear in the list of discus throwers. Rose, Muller, Mucks, Pope, Lieb, Houser, Krenz, Jessup, Anderson, and Carpenter have been the most outstanding.

The foreign countries have always produced the best javelin throwers. Of these, Jarvinen has been the greatest even though Stoeck of Germany beat him in the Olympics of 1936. Of the Americans, Angier, Hines, De Mers, Metcalf, Bartlett, Legore, O'Dell, Mattram, and Terry have excelled.

These competitors would not have had a chance to make their records had it not been for the numerous officials and coaches who organized the meets. The men organizing and administering the various district meets, regional meets, semi-final and final meets deserve a great deal of credit for the success of the sport. The officials who spend many hours during the winter helping to stage the popular indoor races should also get a vote of thanks. All factors have developed the sport of track and field into a fine wholesome form of recreation.

As the young athlete reads through the following pages describing the accepted techniques in the various events he should constantly remind himself that the great track and field men named above practiced hours, months, and even years to attain stardom.

CHAPTER I

THE FASTEST HUMAN

Since man attains his fastest running speed between thirty and fifty yards the fastest human runners should all be classified as sprinters. The sprint events include the short indoor distances from fifty to eighty yards and the outdoor distances up to and including the two-twenty yard dash. Even in the latter event a human runner finds he cannot exert maximum effort throughout the entire distance.

Most boys are thrilled at the sight of flying feet and long to run with the swiftness of the deer. This is indicated by the fact that a large majority of boys who turn out for track want to be sprinters. Every aspiring track athlete should realize, however, that even though the sprint events are spectacular only those persons attain success who have inherited natural speed and quick reaction time.

Sprinter Types.—Sprint champions have developed from a variety of physical types. Some have been short and stocky like Paddock of Southern California while others have been as tall and powerful as Metcalfe of Marquette. Still others have been small slight men such as Williams of Canada, Scholz of the New York Athletic Club, or Toppino of Loyola. The tall man usually has long powerful muscles and the short man has short thick ones. Since driving power is the chief requisite it matters little what type of muscle produces it. The man of average size, however, with smooth running form and long muscles from hip to knee seems to be the most successful. Owens of Ohio State was this type. Nervous energy and a quick reaction time also seem to be essential qualities of a sprinter.

Techniques of Sprinting.—Those runners who have become champions in the short distances have found it necessary to learn such techniques as the start; including the position "on the marks" and the "set"; the pick-up; the sprint; and the finish.

The Start.—The crouch start originated with Sherrill of Yale in 1888 and has been used universally since. Until recently it was made from holes dug in the track, but now it may be accomplished by the assistance of starting blocks.

Starting Blocks.—Experiments have shown that the start is faster from blocks than from holes.

A fast start is essential for the winning of a short race, and while the form of individual sprinters may vary in minor details, the basic fundamentals are the same.

Spacing of the Feet.—In adjusting the blocks the front should be placed from 11 to 19 inches back of the starting line depending upon the length of the lower leg of the runner and the type of start he employs. The rear block should then be placed from approximately 28 to 40 inches back from the starting line, also depending upon the length of the lower leg and the type of start used. (Figure 57).

The Medium Start.—If the sprinter feels most comfortable and gets best results with a foot spacing of medium distance, he should place the knee of the back leg even with or somewhat forward of the instep of the front foot. This is called the *medium start*. If a position is found where the back leg thigh is perpendicular to the ground while "on the marks" and if this position can be held for an interval without strain the relative location of each block should be measured and recorded for reference on other days.

The Bunch or Close Start.—If the *bunch* start is used, the feet should be spaced close together, so close, in fact, that the toe of the back foot should be placed opposite the heel of the front foot while the runner is in a standing position. Experiments indicate that this foot spacing results in the fastest start. It provides a rather high hip elevation, a favorable body lean, and, therefore, a faster foot action.

The Long Start.—In the *long* foot spacing the knee of the back leg is placed opposite the heel of the front foot while kneeling on the mark. Since this foot spacing apparently gives the slowest start, it is not recommended for general use.

Starting Holes.—If holes are used, and they doubtless will be in many institutions for some years to come, they should be so dug that they present a firm support for the feet. The back side of the rear hole should be perpendicular to the surface of the track and deep enough to present a firm area for the push-off. The rear edge of the front hole should slant back at an angle of approximately 45 degrees. Lateral spacing of the feet depends upon the width of the hips. It is approximately 8 inches.

Position of Hands and Arms.—The hands should be placed with the thumbs and forefingers immediately behind the line, and with the weight resting on the tips of the fingers and thumbs. The arms should extend down directly under the shoulders to insure a comfortable balance, yet far enough apart to allow free leg action. The elbows should be straight and the weight should be primarily on the knee as the run-

ner relaxes “on the mark.” Note the hand position. (Figure 57).

The Set.—At the command “Get Set” the back leg knee is raised off the ground until the hips are level with, or a few inches higher than the shoulder. (Figure 57).

Position of the Hips.—The height of the hips in relation to the shoulders varies with the type of foot spacing employed. In other

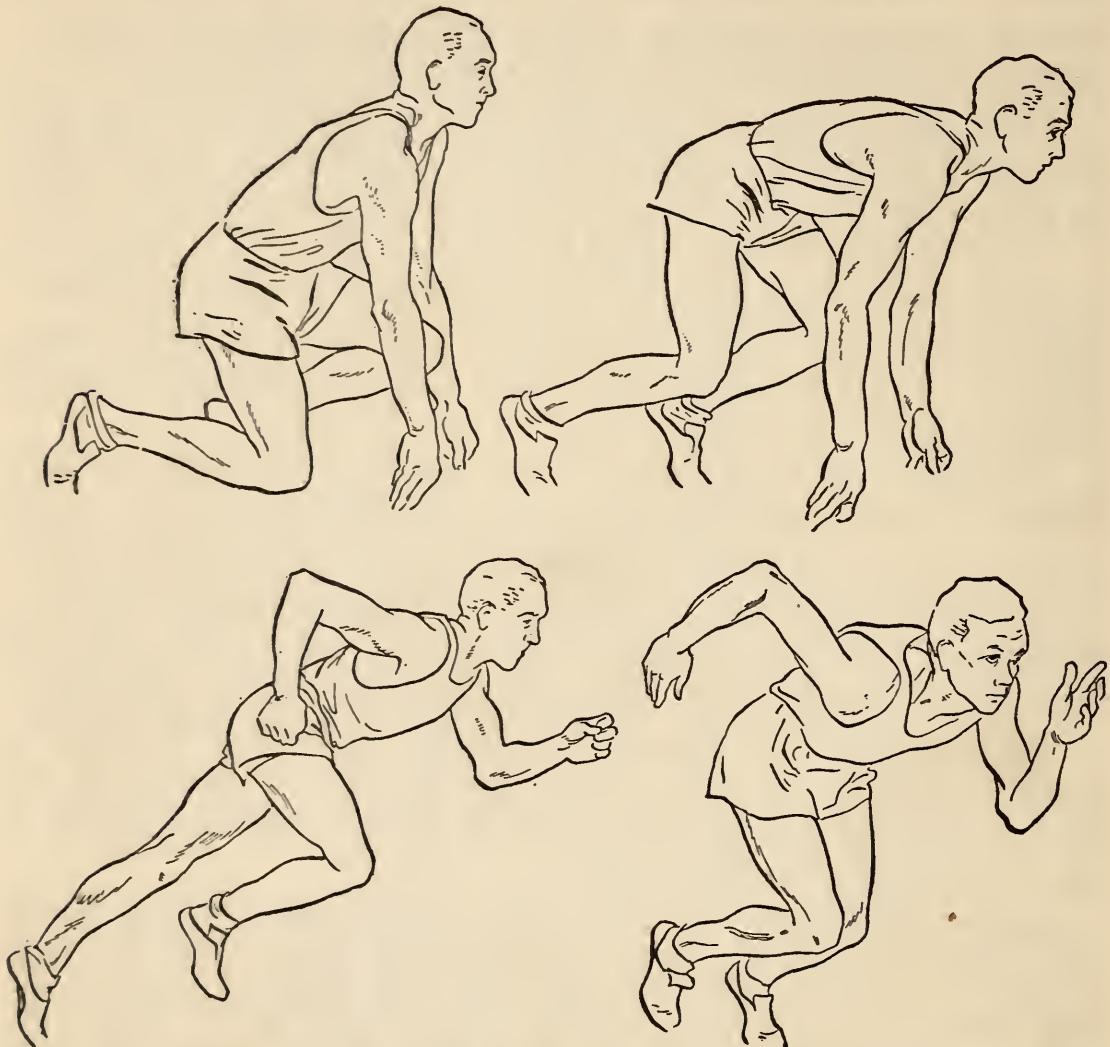


FIG. 57.—The start, including the position “on the mark” (upper left), the set (upper right), and coming off the blocks or out of the holes (below).

words, as a general rule, the shorter the foot spacing the higher the hips.

Body Balance.—The weight of the body in the “set” position should be nicely distributed so the runner has a comfortable feeling of balance. If too much weight is placed on the arms, they are likely to become fatigued and shaky in these days of the two second interval between the “set” and the “gun.” On the other hand, since a large por-



Keystone (FPG)

(Top) The author (Ray Conger, former Olympic Miler).



Keystone (FPG)

The "set" position at the start. Note the hand, arm, and leg positions. Left to right, Charles Paddock, George Simpson, Hector Dyer.



Keystone (FPG)

The "set" position from the side. Observe the relation of the front to the back foot, the slant of the lower legs, the elevation of the hips in relation to the shoulders, and the hand and arm positions. (Jesse Owens)



Keystone (FPG)

Sprint form a few strides after the start. Observe the powerful push off the rear foot, the high knee action, and the vigorous swing of the arms and elbows as they alternate with the leg action. (Paddock)



Keystone (FPG)

Sprint form a few strides before the finish. The leader (Jesse Owens) exhibits ease of action as he ties the World's Record. Note the perfect arm and leg action and the absence of tenseness.



Keystone (FPG)

Three of the world's greatest milers (Cunningham, Bonthron and Venzke). Note the foot and leg action, the carry of the arms and forearms, the swing of the arms and the body angle. Cunningham broke the world's record in this race (Princeton, June 16, 1934) with the time of 4 minutes and 6 7/10 seconds.

Cunningham finishes the mile run.



Keystone (FPG)



Keystone (FPG)

Olympic marathon runners. Note the ball-heel landing of the feet, the relatively low knee action, the low carry of the forearms, and the absence of any pronounced body lean. Zabala won the Olympic Marathon in Los Angeles.

tion of the starting drive comes from the extension of the front leg, the runner should feel a sense of power in it as he crouches in the "set" position. This is particularly true if he uses a bunch start in which case the greatest drive comes from the front foot. There will be some force exerted by the back foot, even in the bunch start, and this force increases as the foot spacing is increased.

The head should be held so the eyes will normally see down the track several yards. This distance will vary with the type of start employed. Since the hips are higher in the bunch start, it follows that the runner will not be able to see very far down the track and still hold his head in a comfortable position.

Breathing.—The attempt of coaches to teach breathing habits while "on the marks" and in the "set" position seems to be an excellent example of over-coaching. Breathing while "on the marks" will be normal if not interfered with. In the "set" position, too, the thoughts of the sprinter should not be concerned with breathing. He should be relaxed with attention focused on a fast start the moment the gun sounds.

Duties of the Official Starter.—Probably in no phase of competitive athletics is there greater need for trained officials than in that of starter. Inexperienced individuals do not understand the psychology of highly trained youngsters who are tense and eager before a race. By sharp tones and commanding attitude the starter can increase that nervousness. On the other hand, by lowering the voice and by proper psychology the starter can instill confidence and decrease the tension. Some officials delight in "setting back" or "disqualifying" a runner. Other weak-kneed individuals lack the necessary courage to hold the contestants until all are steady on the mark.

The aim of the starter should be to "get all contestants away together" rather than stretch a point to disqualify a boy.

Starting Commands.—The starter should take a position where he can clearly see the steadiness or unsteadiness of all contestants.

Taking the Marks.—At the command "On Your Marks" the sprinter should take a comfortable position and relax. The interval between this command and the next one should be from 10 to 15 seconds.

The Set.—At the command "Get Set" the runner should quickly assume the "set" position in which his balance is properly adjusted for a fast break from the blocks. The sprinter should practice holding this position for approximately 2 seconds while still maintaining easy poise and balance without unsteadiness. The interval which the starter

should hold the runners in the “set” position is approximately 1.5 seconds.

The Gun.—Ability to wait for the gun without a false start is a part of the technique of foot-racing. If attention is centered on getting a fast start, the sound of the gun will be heard and all the pent-up energy will be released more or less automatically, without attempting to anticipate the shot. The runner should be ready to go any moment after the command “Get Set.”

Coming Off the Blocks or Out of the Holes.—At the sound of the gun the sprinter should straighten his front leg and push off vigorously with both feet while one arm swings backward, the other forward. If the right foot is back on the blocks, the sequence of movement is: left arm forward, right arm backward, right leg forward and left leg forward. The arm action forward should be vigorous with elbows bent and hands swinging about shoulder height but care should be taken not to swing them high behind.

The first stride should be taken with the foot close to the track and should be about 20 to 30 inches in length. The next stride should approximate 3 feet. The proper technique is a run away rather than a jump away from the blocks. (Figure 57).

It is imperative that the leg and arm action be applied with terrific force and synchronized so the right leg and left arm go forward together as the left leg and right arm come back.

Running the Sprints.—The average sprinter gains full speed somewhere between 10 and 15 yards from the starting line. During this distance the strides progressively lengthen and the body gradually rises to a sprint body lean. The latter angle should be about 25 degrees from the vertical.

The knees should be lifted and the thighs pulled parallel with the ground. As the leg is brought forward the foot should be carried high under the buttocks. The latter movement expends the least amount of energy by applying the simple mechanical principle of keeping the object to be moved as near the propelling force as possible. As the knee is lifted forward and upward, the lower leg should be brought downward and backward in a pawing or slaping motion. The runner should bound off the ground on the toes and then drive the thigh down so the foot has started back before the spikes touch the ground. As the foot touches the ground the center of weight of the body should be directly over or slightly in front of it. The rear or driving leg including the hip, knee, and ankle should be extended backward viciously, thereby, thrusting the body forward at the fastest possible speed.

The Finish.—The finish should be made in normal running form. This means the forward body lean, the head down in its natural position, and the arms and legs driving powerfully through the tape with the goal set about three yards beyond the tape. Some coaches advocate jumping, lunging, or turning into the finish line but there is no evidence that these methods gain any advantage. In fact, such movements interfere with the normal running strides and may even detract from the speed of the finish.

It is important to stress the fact here that well-coached and properly conditioned runners avoid such "grand-standing" conduct as falling on the ground after passing the finish yarn. The runner should slow down gradually, walk on around the track, and then leave the enclosure or join his teammates on the bench or in the dressing room.

The Training Schedule.—The training routine may be divided roughly into three periods. The first three or four weeks should be used for the conditioning process by starts and short dashes with emphasis on form.

The second period should approximate the general plan below. Mondays should include calisthenics, jogging, striding, and wind sprints. Tuesdays should be devoted to starts, two 40 yard sprints at full speed, a 70 yard dash at three-quarter speed, and jogging. Wednesday's practice might well be jogging, striding through two 220 yard runs, and a 60 yard dash at full speed. This should be followed Thursday by starts with three 40 yard sprints at full speed, and a 220 yard run with a 50 yard sprint at the beginning, a 100 yard float, an increase in speed up to the 220 yard mark and a final sprint to the finish.

The third period after the peak condition is reached should contain some such schedule as follows. Mondays might be spent in jogging and wind sprints, Tuesdays could include a half dozen starts and a 70 yard dash, Wednesday's workout might consist of a few starts and a 220 yard run with a fast start and finish and a float in between. Thursday's routine should be light jogging, Friday a day of rest, with the race on Saturday. The program outlined below may be used with slight changes to fit the sprinter's own condition.

The First Two Weeks:

Monday, Wednesday and Friday—Limber up and then stride through about 150 yards at three-quarters speed.

Tuesday and Thursday—Limber up and then take a half dozen short starts. Practice starting from forty or fifty yards at three-quarters speed.

The Third Week:

Monday and Thursday—Limber up and then take two 150 to 200 yard runs at three-quarters speed.

Tuesday, Wednesday and Friday—Limber up. Take a half dozen starts. Sprint 60 yards at full speed.

The Fourth Week:

Monday and Friday—Limber up. Stride through 150 yards twice at three-quarters speed.

Tuesday and Thursday—Limber up. Take a half dozen starts. Sprint 150 yards at full speed.

Wednesday—Limber up—take a half dozen starts. Run 300 yards at three-quarters speed to develop endurance.

The Fifth and Sixth Weeks:

Monday—Limber up. Take three 150 to 200 yard runs at three-quarters speed.

Tuesday and Thursday—Limber up. Concentrate on starting form. Take ten or fifteen hard starts, going out 20 yards on each start. Jog a half mile at the end of your practice.

Wednesday—Limber up. Run 300 yards at three-quarters speed.

Friday—Rest.

Saturday—Time trials or meet competition.

For limbering up the sprinters should jog with a slow short stride for a quarter mile (60 seconds to a 220). Then standing calisthenics should be done for about fifteen minutes. Following this they should stride a half mile (two 80 second quarters, five minutes apart). Lying and sitting calisthenics with push ups should be done for ten or fifteen minutes. After a few "wind sprints" they should be ready for the regular work-out as described above.

A Check List for Coaches and Sprinters.—

1. Pick out men with an abundance of nervous energy and quick reaction time.
2. Work on easy over-distances when learning to sprint.
3. Start working on short fast distances as the legs get into condition.
4. Instruct all sprinters in the crouch start.
5. Concentrate on a fast start.
6. Buy plenty of .22 cartridges and have the men take as many as 15 starts three times a week.
7. Run the full distance or about five yards over the distance eight or ten times during the week.
8. Learn to coast or float the middle way of a 220 yard dash. Do not "apply the brakes" and slow down.

9. Run the last twenty yards at full speed again.
10. Lunge for the tape.

THE 220 YARD DASH.—Practically every sprinter who does well in the 100 yard dash will be called upon to win points in the longer dash.

Types.—Although the types for both sprints are similar, the 220-yard dash requires more of the endurance and stamina element than any of the shorter dashes.

Techniques.—The techniques employed in the 220 are the same as far as start and sprint for finish are concerned. However, in this longer race the competitor must learn to relax during the middle portion of the race and "coast" without losing his momentum.

The Float or Coast.—The float or coast is a form of relaxed running and is used as a method of resting sometime during the middle portion of a race. There should be no loss of form and little, if any, loss of speed, but the driving muscles are less tense and their contractions are somewhat less powerful during this period. The beginner will probably have difficulty in learning the float but with experience he can learn to "save" himself and prevent "tying up" near the finish.

Training Schedule or Conditioning.—The training period is the same as for 100 with the exception that a 300 yard dash is run a couple of times each week for stamina. This is most profitably done in the Monday and Thursday practice periods.

A boy with an excess of nervous energy and natural speed should not consider longer distances because he can be more good to his team running the sprints and competing in the broad jump than any other combination of events.

QUESTIONS FOR DISCUSSION

1. What are the most popular sprint events?
2. How far can a human run at full speed?
3. Is there any uniform body build for sprinters?
4. What are the world records for the 100 and 220 yard dashes?
5. Recall the general factors in the crouch start.
6. How can a sprinter be taught to run out of the marks rather than to jump out?
7. Which type of finish should be recommended?
8. Is the warm up as important as in the longer events?
9. Suggest a week's training schedule for a sprinter during mid-season.
10. Should a sprinter be called upon to run a quarter mile in competition?

TEST QUESTIONS

- T F 1. A boy must have a short stocky build with short thick muscles to excel in the sprints.
- T F 2. Experiments have shown that the start is faster from starting blocks than from holes.
- T F 3. In the bunch start the feet should be close together with the toe of the back foot opposite the heel of the front foot, while the runner is in a standing position.
- T F 4. Experiments indicate that the close foot spacing results in a faster start than the long foot spacing.
- T F 5. Lateral spacing of the feet in the starting holes is approximately 8 inches.
- T F 6. The arms should be bent in the "set" position.
- T F 7. The shorter the foot spacing in the "set" position the higher the hips.
- T F 8. The force exerted by the back foot in the start increases as the foot spacing is increased.
- T F 9. The amount of time elapsing between the command "On Your Marks" and "Get Set" should be approximately the same as the interval between the command "Get Set" and the report of the gun.
- T F 10. The sequence of movements in coming out of the holes is: left arm forward, right arm backward, right leg forward, left leg forward.

AROUND THE TRACK

Three of the most popular events in track are the quarter-mile and half-mile middle distance races and the mile run. Training for the odd distances is similar to the methods and form described below.

The Outdoor Track.—The outdoor cinder track is measured one foot out from a curbing, called the pole, and is usually a quarter mile in length. Once around the track equals a quarter, twice around equals a half, and four times around is equivalent to a full mile. Each event should start and finish in the same place, about midway along one straight-away. Frequently, a two hundred twenty yard straight-away is built down one side of the track for the dash and the low hurdles of the same distance. The quarter-mile may be started out of this "run-way" in which case it finishes on the backstretch. The obvious advantage is that the race is run around one curve instead of two. In this case, the quarter-milers are usually started from scratch, that is, all are placed along the same starting line similar to the practice in the one hundred yard dash. The half-mile may be run out of this "run-way" but the mile is always run around four complete laps.

On a track of this type the runners should wear the regulation sprint track shoe with six spikes in the sole and no heel. The spikes should be sharp and just long enough to give sufficient footing without offering too much resistance in pulling them out of the track when bringing the back foot forward.

Running Indoors.—While indoor running offers a wider variety of conditions in the length of the track, the wind velocity, track surface, and other conditions are usually more nearly ideal. Indoor tracks may be eight, ten, eleven, twelve or even sixteen laps to the mile. In most cases, they consist of an extra track laid on the floor of the auditorium or ground. Some consist of an armory floor where spikes are not permitted. Since armory tracks are not banked on the curves these races are usually slower. The Madison Square Garden track, with its eleven laps to the mile, is soft wood for small, fine spikes, and its banked oval corners for uniform pace is ideal for indoor running. Such a track with an ideal oxygen supply, in place of air heated to 85 degrees and contaminated by the breathing and smoking of 18,000

spectators, might materially assist the miler in bringing the record down to four minutes for the distance.

It takes more intelligent running to win indoors than outdoors. More laps, sharper corners, more jostling, shorter straightaways, and more information from the crowd add many hazards to the race. Even the art of rounding the curves means success or failure. To take an indoor curve without flying to the outside corner requires special consideration. It is necessary to turn the toes and drive the arms as if trying to run toward the axis of the circle. The arms must not be allowed to get away from the sides of the body. Martin of France found his true running style after being told about this fact of indoor running. Most foreigners have trouble because of this fact.

Training.—In middle distance running there are many fundamentals common to all races, such as, smooth economical style of running, forward body lean, semi-flat footed action of the foot, and knowledge of pace. These will be discussed in connection with the event to which they are of special importance. It is well in all events to follow the body weights of the runner throughout the season in order to advise future practices. During the week the weight should be up on Monday and Wednesday and somewhat less on the other days. It will probably be the lowest following a hard race on Saturday, but the Sunday rest should bring it back for the next week's training period. When a runner loses weight, he should attempt to find the cause and try to cure the condition with rest.

Shin Splints.—Many persons associate "shin splints" with a hard track. Experienced runners have found that any track which allows the foot to slip either when it is placed on the track or when the drive is made off the back leg, will develop "shin splints." A track which holds the spikes, whether made of dirt, cinders, grass, or wood, will not cause "shin splints." Sore shins are rare among runners who practice daily on a properly constructed board track, whereas they are quite common among runners who must practice on tracks with poor top-dressing.

Food and Rest.—All runners who expect to excel must comply with the rules of hygiene of normal living. It is well to do all things in moderation and avoid extremes. Diet, sleep, and practice periods are the main factors. Here is a suggested menu.

Breakfast: Banana or other fruit
Cooked cereal with milk and sugar
Soft boiled egg
Jelly or marmalade
Toast, butter and milk and orange juice

Lunch: Soup
 Scalloped cabbage with cheese
 Combination vegetable salad
 Bread and butter
 Ripe fruit
 Milk and fruit juice

Dinner: Roast beef
 Potatoes, boiled or browned
 Squash
 Spinach or string beans
 Lettuce salad
 Bread and butter
 Tapioca cream
 Milk and fruit juice

Eating schedule for the day of a meet:

Seven hours before the meet:
 Half grapefruit or orange with much sugar
 Small broiled steak
 Baked potato
 Lettuce salad
 Celery. Green vegetable
 Toast, milk, and ice cream

Two hours before the meet:

One-half grapefruit or orange with sugar
 Tea and toast (dry with butter at side)

Individuals will vary as regards the necessary amount of sleep. Around seven to nine hours is a desirable rule, with "eleven to seven" an ideal sleeping schedule. The sleeping hours should be regular with no more sleep the night before a meet than during the week. One should be particular, however, about keeping off the feet for the last two days before a hard race and during the warm-up period.

THE QUARTER MILE RUN.—The quarter-mile run is one of the most strenuous, yet one of the most popular, races on the entire track program. The boys who compete in this event should be well developed and in perfect physical condition.

Types.—Quarter-milers are of two types, sprinters and middle distance runners. Yet the sprinter regards it as a distance event and the half-miler regards it as a sprint. At any rate, it takes speed, stamina, and a knowledge of pace. No one can go out and run a quarter-mile at top speed. No particular body build is essential as shown by Eastman, who was tall and slender, and by Barbuti, who was short and stocky. Most quarter-milers and distance runners, however, have long, stringy muscles. The sprinter type of quarter-miler should work to build endurance with 660-yard runs while the distance runner type

will find it necessary to work on starts, 220-yard sprints and 300-yard runs.

Quarter-mile Technique.—It is logical to assume that form in the quarter-mile will be a compromise between that of sprinting and that of distance running. The stride is shorter than the sprint stride but longer than the strides in the distance events. The body lean approximates 15 degrees as contrasted to 25 degrees in the sprints and 5 to 10 degrees in long distance running. The cadence is slower, the knee lift is less pronounced, and the arm action is lower and less tense than in sprinting. There is more tendency to permit the heel to come down even to the extent that it may touch the ground.

The Coast.—The coast is more important here than in the 220-yard dash and will usually come around the 200 or 220 yard mark. If the race is run around a track, the first part should probably consist of a sprint to the turn, followed by a pace slightly under maximum effort, a coast, a gradual increase in speed again, with a full sprinting effort the last 100 yards.

Pace.—When the race is run in lanes, as is often the case at the present time, pace judgment must be very keen and accurate because of the “staggered” start. This means that the man on the inside lane starts at the regular quarter-mile staff, the one running in the second lane starts far enough ahead so the distance to the finish is the same when he rounds the curve in his lane. The third, fourth, and fifth men respectively will be “staggered” or started ahead in a similar manner. The inside runners have a fair chance to gauge their position in the races but the two outside runners have little knowledge as to their relative position until they turn into the home stretch.

Weekly Schedule.—In training for this event, the rules of proper hygiene apply. The weekly schedule is important.

The First Three Weeks.—During the first three weeks slow jogging, such as 60 seconds to the 220-yard run, should be alternated with calisthenics for an hour and a half workout daily. It is important to do less work than seems adequate, the first couple of days of the week, and then gauge according to stiffness and general condition the remainder of the week. The runner should try to develop a smooth, swinging stride early in learning the quarter-mile pace. Work in the fall with the cross country team will help to develop this swinging stride.

The Second Three Weeks.—During the second three weeks the runner should start regular workouts with emphasis on starting and sprinting.

Monday—Warm up thoroughly on jogging and calisthenics for every workout. Run an easy 660 yards.

Tuesday—Practice starts with sprinters and stride through a half-mile with a quarter in eighty seconds, rest five minutes, and stride another quarter in eighty seconds.

Wednesday—Practice four starts with the last one a 40-yard sprint. Swing through 300 yards at a comfortable speed. It is not necessary to cause the legs to pull during these early season workouts.

Thursday—Practice baton passing as a variation. In addition to contributing to stamina and endurance it develops team work and an interest in teammates. This is fine preparation for the relays races during the track season.

Friday—Report at the field, take a shower, weigh, and go home feeling refreshed.

Saturday—Run a time trial for pace but not for best performance.

Another Suggested Schedule.

Monday—Warm up. Six or seven 50-yard runs followed by a 660 at $\frac{7}{8}$ speed.

Tuesday—Slow jogging, followed by a 350-yard run at 440 speed. More slow jogging afterward.

Wednesday—Two 150-yard runs as 220-yard dash speed followed by one 220 at 440 speed.

Thursday—Warm up and then run 300 yards at little better than 440 speed.

Friday—Rest.

Saturday—The track meet. Warm up with slow jogging and calisthenics and one 150 yards at three-quarter speed one-half hour before the race.

For a racing schedule the following seems to be a general rule. The first two hundred and twenty yards should be about two seconds faster than the second two-twenty. When Eastman ran 46.4 he ran the first two hundred and twenty yards in 21.4 seconds and the second in 25 seconds. A 50-second quarter mile should probably be run 24 seconds for the first half and 26 seconds for the second half of the race.

Racing Tactics.—Racing tactics are probably more essential in the quarter-mile than in any other event on the program. Jostling at the start is very costly in energy conservation and may result in loss of the race. This hazard is eliminated if the race is run in lanes but it is still run in many places from an even start with at least six men striving for the inside position.

Speed to the First Turn.—The sprinter has the advantage in this situation, if he is really willing to break fast at the crack of the gun. The best strategy is to come off of the blocks at full speed and sprint for at least forty yards. At all times the runner should pull as close to the inside lane as competitors will allow, always careful to keep the arms driving in normal fashion. If someone is pressing from an outside line, the runner should keep in front of his elbow. One vigorous elbow thrust from an opponent is often too great a handicap to overcome. Furthermore, it is almost fatal to draw an inside lane and then arrive at the first curve in fourth or fifth place with opponents on all sides. In such a situation, the runner should edge out, as the back stretch is approached, and keep the stride as regular as possible. He should avoid cutting the stride or a quick change of pace.

Running the Back Stretch.—If an opening is seen at this time, there should be a gradual pick-up in speed until a favorable position is gained for the second curve with an opportunity to run near the inside. One should avoid the position next to the curb with one man in front and another who can be heard breathing and stepping closely behind, but rather lockstep the left leg with the front runner's right. This necessitates running only a few inches wide and makes it possible to go along with a passer without crossing over behind the flying legs of the man in front, thus avoiding chopping the stride or stumbling.

Strategy in Passing.—The effort required in passing an opponent is likely to be costly in energy consumption. The runner, therefore, who plans to pass his rival should increase his speed and reduce the lead gradually, until the moment of passing. He should then initiate a burst of speed, pass his opponent as quickly as possible, and resume the normal stride again. Obviously, this should be done on a straight stretch, but may be permissible on a curve if little more than normal effort is needed.

Strategy Against the Passer.—Every foot racer will encounter one or more challenges during the course of his race. The first one will occur in the fight for the pole at the very start. The strategy in this situation was discussed above. If he is among the leaders he may be repeatedly challenged through the entire distance. If he is out in front he should watch the pace and keep close to the curb. Whether he elects to meet all challengers or permits them to pass him by will depend upon the pace, the stage of the race, the type and dangerousness of the runner attempting to pass, and other factors. If he is maintaining his normal pace, he may reject the challenge. He may do likewise

in the early stages of the race. On the other hand, he must stay close to a dangerous rival and should fight off all passers in the last part of the race, if he hopes to win.

If a fast finisher, he might well slow down the pace and go along with a passer. It is good strategy to keep the passer optimistic so he will keep up and round the turn in the second lane. At the last turn the speed should be gradually increased with a more vigorous arm thrust and a more rapid pulling of the legs. He should stay as relaxed as possible until the last stretch sprint.

The Finish.—With one hundred yards to go, the quarter-miler should head straight down the track with the utmost spring and without any attention to the competitors. He should aim to finish three yards beyond the tape. An obvious last minute tip is to get in the lead and stay there. In a heat, or qualifying run, a place should be gained as easily as possible without slowing up five yards from the tape. The energy used in holding the regular pace is not apt to be as costly as the possibility of someone slipping by and causing elimination.

THE HALF-MILE RUN.—Many factors in form and training for the quarter-mile also apply in the half-mile. Naturally, some differences exist since the event comes late in the schedule of events on the day of a meet. Frequently, too, many of the milers and quarter-milers are also found in the half-mile. This may make it a slow race. On the other hand, some athletes run the second race of the afternoon in comparatively better time than that recorded for the first race. Furthermore, when milers compete with quarter-milers, as they frequently do in the half, they like to go out fast and wear down the short distance man. If this happens, the time is likely to be fast, inasmuch as the quarter-miler expects to stay near and overtake the others on the home stretch. Many runners, after competing in the mile, think it unnecessary to go through that extra half-hour of work before running the half-mile. Experience has proved the need for a proper warm-up even under these conditions. Without it breathing is likely to be labored and difficult, the chest may seem paralyzed, and there may be local distress in the acting muscles.

It seems reasonable to believe that "second wind" is the thing with which we are dealing when we fail to warm-up properly. In a good half-hour warm-up we get past the condition known as "first wind" and start the race on "second wind."

Gould and Dye¹ have summarized the problem of second wind

¹ Gould and Dye. Exercise and Its Physiology. A. S. Barnes & Co. New York, p. 374.

as follows: "The initial dyspnoea produced by strenuous exercise is accompanied by a disturbance of the normal acid-base balance of the blood and tissues. The relief of second wind is probably the result of the adjustment toward a new equilibrium on the various mechanisms engaged in the supply of the much needed oxygen to the active tissues. These adjustments involve primarily the circulatory and respiratory systems, but adjustments must also be made in the muscular and heat regulating mechanisms.

"When the exercise is very strenuous the new equilibrium may be such that each of these systems is functioning at its maximum capacity. Under these conditions oxygen is being supplied to the tissues and carbon dioxide being removed from them at above the maximum possible rate while the lactic-acid content of the tissues is held at a relatively low level. The alveolar carbon dioxide falls below that present during dyspnoea, the tissues become less acid, pulmonary ventilation is

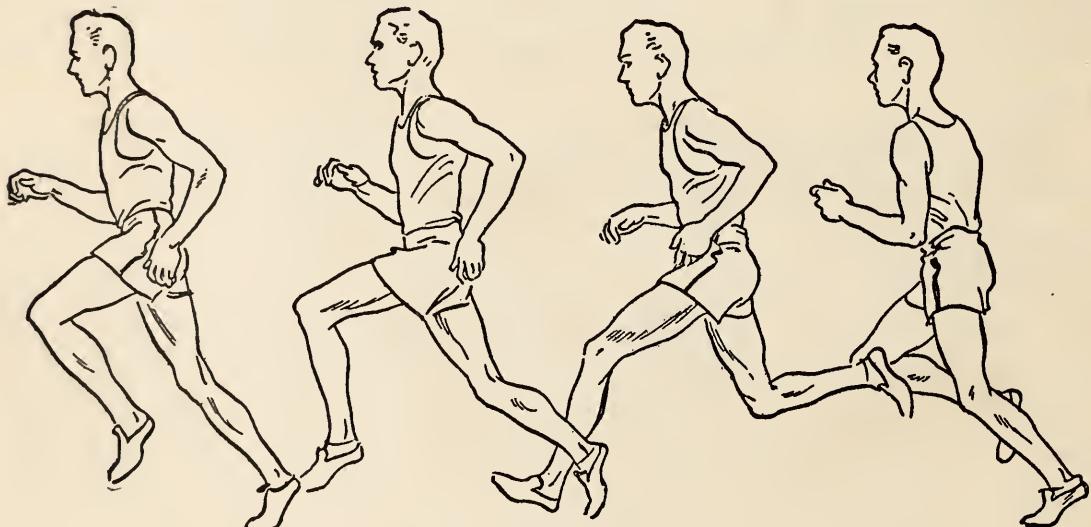


FIG. 58.—A full, easy running stride.

decreased, the pulse rate is diminished, and perspiration begins thus affecting a greater heat loss from the body and the bodily efficiency rises.

"The onset of second wind may be gradual or abrupt and usually occurs in from one to three minutes after strenuous exercise begins. The initial dyspnoea may be diminished through training."

Racing Form.—The successful half-miler has an easy swinging style with a long stride, arms swinging naturally at the side with no change in the angle of the elbow. The way to pick a half-miler is by trial rather than by judging his build, his weight, and his height. Style ranges from the high knee action, sprinting style of Hahn of the Boston A. A. to the long, sweeping style of Edwards of Canada.

The Training Schedule.—For a weekly training schedule, the following is suggestive.

Monday—A day of relaxation. Jog three-quarters of a mile and sprint the finish.

Tuesday—Run a 2:10 half with a sprint the last 80 yards. This 2:10 applies to a two-minute ~~half~~-miler. Slower or faster men would run accordingly.

Wednesday—Run a 660, covering the first 440 exactly as the first quarter of a regular half-mile race. Also run the last 220 exactly as the last two-twenty of the regular half mile should be run.

Thursday—Play Day. Play around easily according to preference.

Friday—Rest.

Saturday—Time trial or meet.

It might be wise to put in some starts on Tuesday and Thursday with three hundred yard runs for the slow runner on Tuesday in place of the 2:10 half-mile.

The Racing Schedule.—The racing schedule is similar to the quarter with a few authorities believing the first quarter-mile should be three seconds faster than the second. However, most coaches are of the opinion that the first quarter-mile should be two seconds faster than the second. If this is true, a 1:50.0 half-mile should be :54 and :56 seconds, although one of Edward's 1:52.4 half-miles was :52.4 and :60 seconds. A two-minute half-mile should be run in :59 and :61 seconds.

Racing Tactics.—Tactics enter into the half-mile but there is more chance to correct an error in this race than in a quarter-mile run. A fast finisher can hang on to second or third place until the home stretch, whereas a distance type runner must know pace and run against his best time regardless of competition. Both types of runners must avoid "boxes" and run close to the curb on the curves.

THE ONE-MILE RUN. Physical Qualifications.—The mile has often been classified as a distance event but during the past few years it has developed into an event for the half-miler rather than the two-miler. In this event as in certain others no particular type of body build predominates. Sears of Butler and Schimek of Marquette have shown what small, slight men can do and Reese of Texas and Niblock of Oklahoma were milers over the six-foot height. The average is the type of Venzke of Pennsylvania, Cunningham of Kansas, and Bonthron of Princeton.

Probably the most valuable asset in a miler is a strong heart. Both the physical heart, or pump, which must pump pure oxygenated blood

from the lungs to all parts of the body and the heart we speak of when we say "he has the heart to do it" are essential for success. It takes a person filled with determination and courage to go through the hard third quarter. As in all running events beyond the sprint distances it is necessary to have a sufficient supply of oxygen and energy all along the way. There must be, therefore, efficient use of food products and oxygen. Not all people are born with a respiratory system which can get oxygen from the air to lungs, to corpuscles, to muscles efficiently. It is easier to develop a miler than a sprint man, yet heredity plays a big part in all athletic contests. As compared with the present day thoroughbred race horse, human runners are of nondescript breeding. Consideration of proper heredity and eugenics would bring the records unbelievably lower.

Running Form.—Mile runners show a wide variety of differences in form. For this reason it is not necessary to rebuild every man who

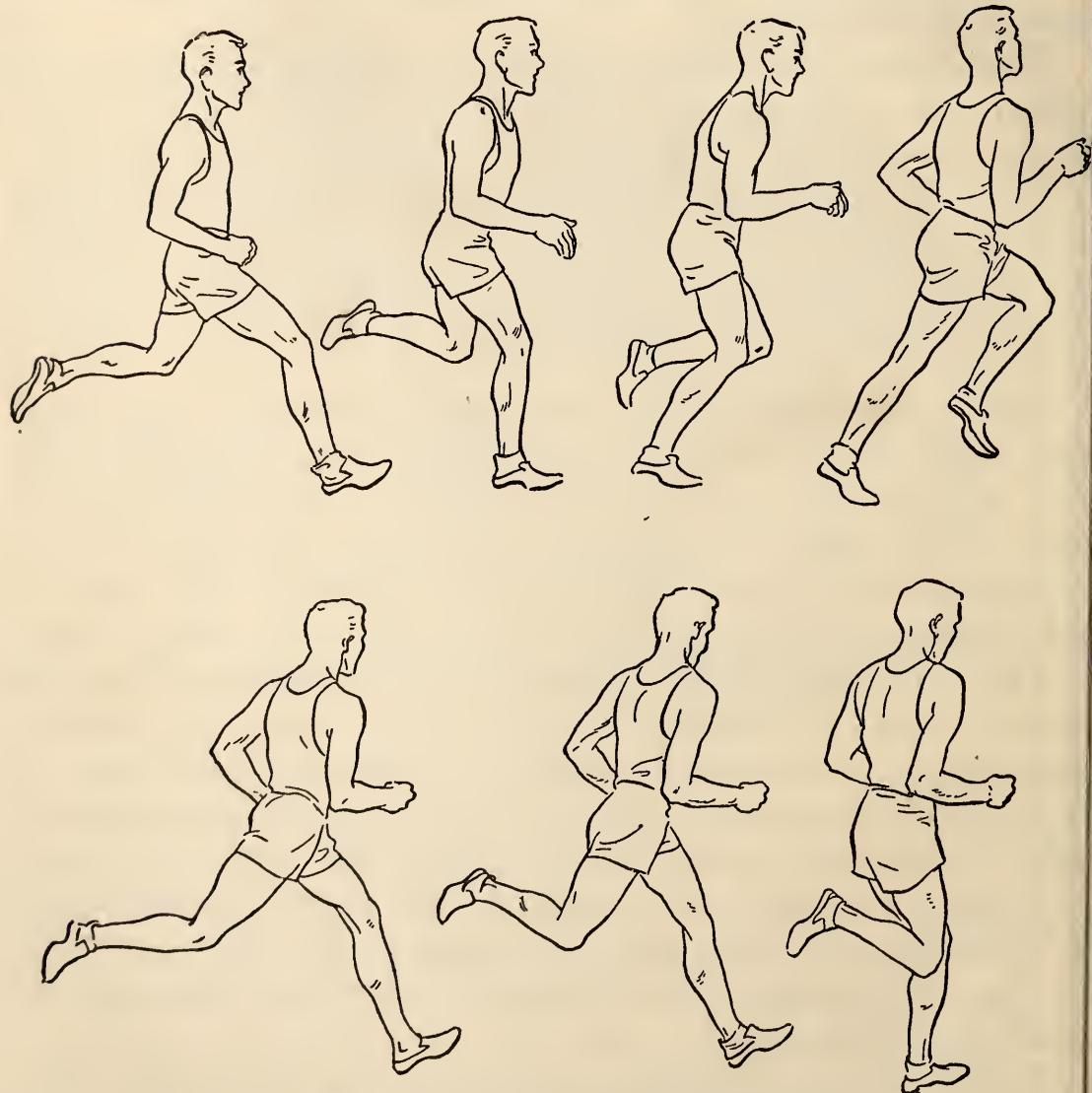


FIG. 59.—Distance running form.



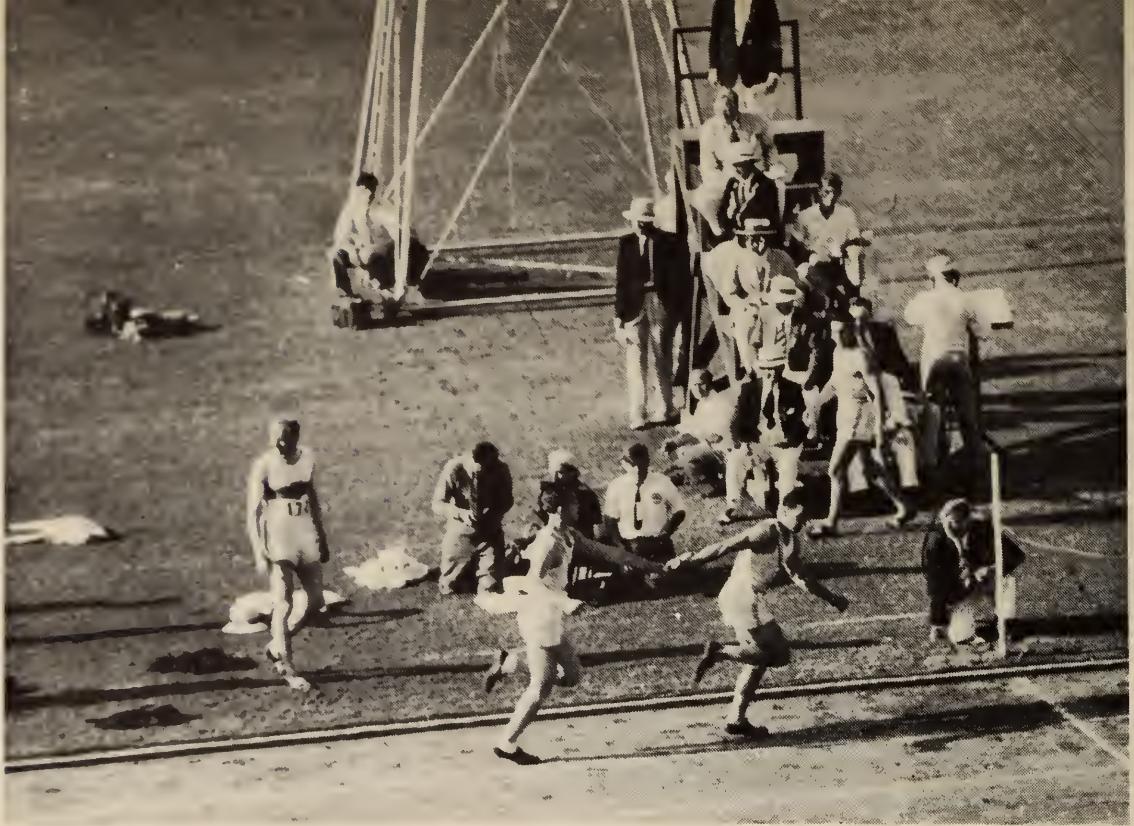
Keystone (FPG)

While a variety of individual forms may be seen in this marathon, similarities are also discernible. The Boston Marathon in 1935.



Keystone (FPG)

One type of blind pass in relay racing. The palm of the receiver is *down*.



Keystone (FPG)

Another type of blind pass in relay racing. The palm of the receiver is *up*. The 400 meter relay at the Olympics, Los Angeles, 1932.



Keystone (FPG)

Hurdling technique. The hurdler on the inside is rising to go over the hurdle. Note the position of his lead leg, the action of the arms in alternating with the legs, and the body dip forward. The man in the lead should snap his lead leg down sooner.

comes on the track to conform with the Finnish form of Nurmi or the lower arm, sweeping type of the American runners. The essential thing for success in the mile is an economically working machine which expends little effort except for movements straight ahead. The coach should teach his miler to point his feet straight forward, and flex his arms at the sides, forming approximately a right angle between the upper and lower arm. The arm action is relaxed rather than vigorous with the hands only slightly cupped. When in action the latter should not cross the median line of the body. The torso should be inclined somewhat forward with the shoulders and head in the normal position which a person assumes in walking. The eyes should be focused about ten yards up the track. The shoulders should show little movement unless the miler uses a body swing from the hips similar to Nurmi and other foreigners. Relaxation is essential on the track and during the week. (Figure 59).

Experience shows that almost anyone who can go out without special training at sixteen years or older and run a 5:15 mile can develop into a fast miler. An active background, such as living on a farm, is a great asset to one who intends to run the middle distance races.

Importance of Proper Foot Action.—The importance of pointing the feet straight ahead can readily be seen upon close analysis. *With the heel firmly in place and the toes pointing straight down the track, it will be seen by turning the toes out at about a twenty-degree angle the point of the foot will be about one-half inch back of the former position. This distance alone will make about three yards difference in the mile run. Many races are lost by less than this amount.*

The Stride.—A smoothly executed stride with an economical use of energy is of more importance than the actual length of the stride. Frazer of Kansas was a little miler with an accented stride which did not, however, seem to fatigue him. On the other hand, Cunningham, who is of rather large stocky build, seems to understride. The success of Finland's runners seems to be due to their marvelous physical condition and their ability to run full speed with the muscles relaxed.

General training rules for the mile parallel the rules for a wholesome and normal life. Training is normal living with practice periods scientifically considered for conditioning.

The Training Schedule.—The training schedule is very important in the mile event. It is not necessary to run a mile every day of the week. In fact, most successful milers never run a mile for time

except during the scheduled race. As a general rule, he should run over-distance on Monday, under-distance on Tuesday, a time trial just short of the distance on Wednesday, a pace-judging quarter-mile on Thursday, nothing on Friday, and the race on Saturday.

The following is adapted from Hargiss,¹ former coach of Glenn Cunningham.

The Mile Run. Assuming mid-season.

Monday—Easy warm-up calisthenics and rope skipping 10 or 15 minutes, jog two easy 440's for rhythm, form and ease of stride. Walk one 440 and finish with 75-yard sprint.

Tuesday—Warm-up slowly, 5 to 10 minutes rope skipping. Use Indian clubs for arms and co-ordination. Run three single 440's for judgment of pace and speed. If running 4:20 mile, run 65 second quarters—walk 440 between each. Finish with 220 sprint.

Wednesday—This should be the hardest workout of the week. The amount determined by condition of the individual. Easy jogging for warm-up. Rest. 660 even time in about 1:35. Rest 10 or 15 minutes. Then another 660. Emphasize ease of stride. First 440 in 62 seconds—last 220 in 8 seconds.

Thursday—Warm-up. Calisthenics—Indian clubs—rope skipping 10 or 15 minutes. Jog two easy laps. Walk 440 then finish with two wind sprints of about 75 yards.

Friday—Optional whether to report or not—sometimes advisable to report for light work. Easy jogging and walking for two laps—one short sprint of 50 yards.

Saturday—Track Meet—warm-up before event. On the track 30 minutes before race—warm-up easily. Jog two laps—walk—rest. Do 440 in 65 seconds. Rest then 220 at 4/5 speed—rest.

Remarks—Avoid stereotype training program. Study individual—vary work according to condition and need. After season begins avoid successive hard workouts. Under-work rather than overwork—common sense best menu. Practice should be for ease of effort—running form, speed—no over-distance work—plenty of rest, sleep, and good food. Avoid hot baths and excessive rubdowns and massage. Care of feet very important—often advisable to practice in heavy basketball shoes.

The Warm-Up.—The warm-up for this event is very important. Here is an outline of the warm-up used by the author, copied some-

¹ Hargiss, H. W. "Track Coaches Talk". The First Aider. The Cramer Chemical Co. Gardner, Kansas. Vol. V. No. 2. p. 2.

what after Nurmi. The miler should arrive at the place for the meet one and one-half hours in advance of the race, after spending the day off the feet. The following schedule should begin three-quarters of an hour before the race:

1. Jog an easy quarter-mile with short strides. This will warm up and loosen the leg muscles, increase the heart and lung action, and bring some perspiration.
2. Take ten minutes of standing calisthenics including arm swinging, body bending, and leg kicking for height.
3. Stride a half-mile, which, if timed, would be about eighty seconds to the quarter. This may all be done at once or in two twenty or four forty yards at a time.
4. Go through another calisthenic drill with the legs. The exercises recommended are the dip, the leg raiser, and the sit up.
5. Follow with short sprints of fifty yards each around the track to get everything in action that will be used during the race.

This routine leaves about ten to fifteen minutes in the training room. The first part of this period should be spent in a prone position on a bench with the feet up to aid the blood in returning to the heart. Here is a personal experience which might help someone. During the 1929 winter indoor season following the Millrose meet in which the writer had defeated Nurmi of Finland in the Wanamaker Mile, he was sitting in the training room at this stage of the warm-up preparing for the Columbian Mile with Wide of Sweden as the main competitor. Nurmi came in the door, pointed at the feet of the two of us who were to compete and said nothing. Wide was lying on a bench with his feet high on a waste paper basket while yours truly was sitting on a bench with feet placed on the shoes rather than the cold floor. Nurmi smiled as the hint was taken and the feet were placed high up on another basket. Wide was defeated that night and the practice was continued thereafter.

Assume the sitting position, following this rest, rub a bit of wintergreen on the legs, chest and stomach, lace the shoes and return to the track for five minutes of rewarm-up including a jog around the track and a couple of wind sprints of thirty yards each. Be at the start when the whistle is blown.

Racing Schedules.—Here are some of the racing schedules bringing out the necessity of pace judgment which has been learned in practice. The professional miler, George, did the following: :58-2:01-3:07-4:12 $\frac{3}{4}$. Conger ran the following in the race with Wide: :60-2:05-

3:10-4:13 $\frac{3}{5}$. Cunningham did the following: :62-2:06-3:07-4:06.7. A 4:40 miler should attempt an even pace throughout, such as: :67-2:16-3:30-4:40.

Here are some racing tactics:

1. Get down on the marks.
2. Go out with a fast sprint for forty yards for position.
3. Settle down in first, second or third place at the first curve.
4. Lock step, the left leg going along with the right leg of an even-strider just ahead. This makes it necessary to be only about six inches wider than the one in front.
5. Run a bit wider, when someone passes, to avoid a box.
6. Think of others, their position, their condition, and not of personal fatigue.
7. Never trail a novice; he is bound to interfere.
8. Stay with the leaders on the third quarter no matter what the condition.
9. Start for the finish with three hundred yards to go, as a general rule. Wait until the home stretch, if capable of a sprint finish. Without a fast last-minute "kick," carry the race along the entire last half-mile.
10. Never look back.
11. Come off a curve fast before passing a man on the straightaway, if on a small track.
12. Aim to finish three yards beyond the tape. Many races are lost in the last two yards.

Here is a life schedule for a miler:

As a child—active life of a normal child with much hoop rolling, etc.

In high school—sprint, play baseball, and other light active games, tennis, golf, etc.

In college—run cross country in the fall, quarter miles in the winter season, and half-miles occasionally.

Just out of college—a miler will have the most stamina and record-breaking performances between the ages of twenty-two and twenty-seven.

Later life—back to tennis, golf, horseback riding, volleyball.

Old age—hikes, one round of golf occasionally, and gardening.

Remember to: congratulate the winner, make friends, be gracious in victory and be pleasant in defeat.

QUESTIONS FOR DISCUSSION

1. What events are considered as middle distances?
2. List the good qualities of a quarter mile track.

3. How do indoor tracks differ from outdoor tracks?
4. What are the characteristics of a quarter-miler, half-miler and miler?
5. Make up diets for three different days, one being the day of a race.
6. How much sleep does a runner require?
7. Memorize enough records to gain a knowledge of good times for these events.
8. How important is running form in these events?
9. Summarize training schedules and generalize for future use.
10. Make a list of racing tactics to inform a runner who has had but little experience.
11. What is the best way to gain a knowledge of pace?
12. Define: "second wind," pole position, "staggered" start, "a box" warm-up, dyspnoea, novice, banked track and "shin splints."
13. Is cross-country good training in the fall?
14. What racing schedule do most quarter-milers use? Half-milers? Milers?
15. Why are the middle-distances so popular in the big indoor races of the East?

TEST QUESTIONS

- T F 1. The outdoor quarter mile track is measured one foot out from a curbing, called the pole.
- T F 2. A hard surfaced track is not the primary cause of so-called "shin splints."
- T F 3. The forward body lean in the quarter-mile approximates 15 degrees as contrasted with 25 degrees in the sprints.
- T F 4. In the quarter-mile the cadence is slower, the knee lift is less pronounced, and the arm action is lower and less tense than in sprinting.
- T F 5. In the quarter-mile run the time for the first 220 yards should be about two seconds faster than the time for the second 220 yards.
- T F 6. The quarter-miler who draws the inside lane should aim to arrive at the first turn in fourth or fifth place.
- T F 7. The middle distance runner in second place with one man close in front and another opponent about to pass from behind should run as close as possible to the curb.
- T F 8. The first quarter of the half-mile run should be at least 5 seconds faster than the last quarter mile.
- T F 9. A miler can more evenly distribute the work of his leg muscles if he will run entirely on his toes.
- T F 10. By toeing out at an angle of 20 degrees a runner can lose as much as three yards in the mile race.

CHAPTER 3

AROUND THE TRACK AND OVER THE HILLS

The long races, including the two-mile run, the cross country run, and the intermediate races, are not as popular as the shorter distances. This is not surprising in view of the endurance required and the common belief that these races are too strenuous for young persons.

The two-mile run and the two-mile team races, however, are promoted as a fall sport in some colleges and are run on the regular outdoor track. Conditions are somewhat similar to those discussed under the middle distances with the exception of the two-mile team races which are run over the track in the fall. As a general rule, however, the tracks are not as well kept during freezing weather. Cross-country, on the other hand, is run over a variety of courses. Some are smooth and fast; others are over hills which are rough and very tiring. In some instances the race is run over pavement or dirt roads.

Physical Characteristics.—As a general rule, the long distance runner is of slight build. The small, wiry man with long muscles seems to be able to stand the constant slow pace better than a heavier individual. The layman finds it hard to understand why some athletes can run for such great distances with little distress. If it were possible to take a look inside the distance runner's body and get a clear picture of the muscles, lungs, heart, and blood of a well-trained individual, this might be easier to understand.

THE TWO-MILE RUN. **Types.**—The two-miler is usually of a slender build with long muscles. His weight averages between 120 and 160 pounds and his height between 5 feet 8 inches and 6 feet. It is common to see men 25 to 30 years of age winning the event in open competition. Many of these have been running shorter distances but have lost some of their speed and have gained greater endurance. A coach usually finds the distance runner a little easier to train than a sprinter, since he is likely to be somewhat more mild mannered and dogged in his activities. He shows less nervousness as he has found it necessary to remain relaxed on all occasions. While the expenditure of nervous energy is an important factor in speed races, conservation of energy is paramount in endurance races.

Running Form.—There is no specific best form, but certain similarities or generalities can be observed. The long distance runner tends to keep his forearms somewhat lower. A right angle at the elbow is recommended for the shorter distance since assistance in the drive must be gained from the arms. But in the case of the two-miler, the arms can be dropped a few degrees to obtain a comfortable swing in harmony with a smooth stride. The body should have a slight forward lean even though many of our present day runners run almost erect. The legs need not be brought up as high in front, which results in less tendency to kick up behind.

It is also important that the work of the leg muscles be evenly distributed in the races of longer length. *This is done by means of a ball-heel landing of the foot.* Some coaches even advocate landing on the heel to relieve the toe muscles of the shock of landing.

Condition.—Nowhere in track and field does condition play a more important part than in the two mile. A runner with average ability can go a long way toward championship class by training correctly year after year. A word should be said here in favor of long hikes over the mountains and flats to gain strength of legs, and general endurance of the body. Hiking adds variety to the training procedure that is welcome to the distance runner. The knowledge, pertaining to nature and the ways of the universe, that can be learned on these hikes, is an asset to a well-balanced personality as well as to later running. It is not quite so necessary for a runner as it is for the football player to "live" the sport of his choice. The latter must concentrate on plays and study them constantly. The runner's main thought is to build stamina and much of this can be done by walking over interesting haunts.

Training Schedules.—While endurance is essential in the distance runs a sprint is also an asset. The schedule, therefore, should include training for each. A basic schedule is suggested below. Run: over-distance on Monday, under-distance on Tuesday, just short of the distance on Wednesday at regular two-mile pace, and under-distance again on Thursday. Rest on Friday for Saturday's race.

Monday—Warm up several minutes by jogging on grass. Practice short starts with the gun. Run two-and-one-half miles for endurance, then walk until rested.

Tuesday—Warm up by jogging on the grass. Run one-and-one-half miles at a two-mile pace. Walk until rested. Run a slow quarter.

Wednesday—Warm up in the usual way. Run two quarters at regular distance pace. Walk until rested. Run a slow mile.

Thursday—Same as Tuesday.

Friday—Rest.

Saturday—Time trials or competition.

It might be well to exchange the Wednesday and Tuesday “work-outs.” That would also make the Thursday practice the same as the Wednesday routine.

Racing Tactics.—Although some great distance runners, such as Lash of Indiana, alter their speed many times during a race, it is still considered best to keep a uniform pace. And the longer the race the steadier the pace should be. It is not necessary for the experienced runner to carry a watch during a race. If the time of his laps are called to him in early season practice, he will soon find that he can judge his pace to within a second per quarter. An athlete capable of a sprint at the finish need worry very little about his position in the race if he is not back too far. If he stays behind a smooth striding leader, he should be able to win by a two hundred yard sprint at the finish. There are many instances, however, where it is essential to know the pace, since one man may be sent out to tire the leaders so a teammate may come up and win the race.

When one has acquired pace judgment by running quarter-miles night after night and has learned a certain pace, it is well to keep in mind that due to nervousness he may go out too fast in a race. It is dangerous to run the early part of the race too fast. It is better to go out fast from the start, gain a comfortable place in the field of runners, and settle down to a uniform pace after fifty yards. This rate of speed should be maintained throughout the major portion of the race with slight alterations due to gaining of positions. When within approximately one hundred yards of the finish, however, the runner should sprint right through and beyond the tape at the finish line. Entirely too many races are lost, after a hard run, by thoughtlessly slowing down within a few yards of the finish line.

CROSS-COUNTRY RUNNING.—Some boys really enjoy maintaining a jog run over rolling hills, through wooded glens, on dusty roads, across winding streams, and past country homes. This is especially true if they are members of a group in a cross-country run.

Cross-country records vary with the distance, condition, and contour of the course. It is unfortunate in scoring team races that more people do not know what a cross-country score means. The winner is given a score of one, the runner-up gets two points, the third is assigned

three points, and so on. The low score wins the team championship. If two teams of seven men are competing with five to count in the team score, there are two methods of figuring the results.

Illustration:

Red team takes	Red	Blue	Place
Red " "	1st		"
Blue " "		2nd	"
Red " "	3rd		"
Red " "	4th		"
Blue " "		5th	"
Blue " "		6th	"
Blue " "		7th	"
Blue " "		8th	"
Blue " "		9th	"
Blue " "		10th	"
Red " "	11th		"
Red " "	12th		"
Red " "	13th		"
Red " "	14th		"

One way of scoring would make the Blue team the winner:

Red team: 1-3-4-11-12 for a total of 31 points.

Blue team: 2-5-6-7-8 for a total of 28 points.

The other way of scoring would make the Red team the winner:

Red team: 1-3-4-9-10 for a total of 27 points.

Blue team: 2-5-6-7-8 for a total of 28 points.

In the first method of scoring, the sixth and seventh runners of the Blue team scored by causing the Red team to count the exact place they took in the race. In the second plan of scoring, these two men did not count in any way, so the fourth and fifth men on the Red team took ninth and tenth places. The first method seems preferable.

Physical Types.—Most of the good milers and two-milers of the country will be found running across the green fields and golf courses in the fall. It follows then that the description of individuals given for two-milers will serve for cross-country runners as well.

The Values of Cross-Country Running.—Many coaches are concerned about the value of cross-country running as a conditioner for their college men or the benefits accruing to high school boys. Already some of the colleges have eliminated the cross-country competition of the fall season. The Big Six Conference, which includes the Universities of Kansas, Nebraska, Missouri, Oklahoma, Kansas State College, and Iowa State College, has changed its annual cross-country runs to two mile team races. At first thought, it would appear

they had concluded that cross-country was too strenuous for college men and fitted primarily for men of post-college level. Obviously, if too strenuous for college men, it certainly would also be too strenuous for the high school athlete. There were, however, other things which entered into the change. It was found that football crowds were far more interested in a team race between halves of the ball game, than they were in cross-country runners who came straggling in from their long jaunt sometime during the latter moments of the second quarter of the game. Furthermore, some of the coaches were interested in using a two mile team race as a developer of middle distance men for their winter and spring teams.

Certain questions naturally arise. Does distance running put too much of a strain on the heart for the boy of high school age? Are there benefits which overshadow any harm that might come from competition in the longer runs?

Most of the discussion of this subject has dealt with the effects of cross-country running on the physical health of the participant. Some persons believe it does great harm to an adolescent boys' heart and other vital organs while others believe our men will degenerate in our easy civilization unless we promote activities of this type as developers of physique and organic vigor.

Olds¹ describes a piece of research on five competing high school cross-country teams in which they examined the following: age, height, weight, horizontal and vertical pulse rate, pulse recovery test, urine analysis, heart and lungs, and length of training period. The general results of the test indicated that the race was not too severe for high school boys. It suggested a need, however, for proper supervision of practice periods.

Track and cross-country have been labeled individualized sports which tend to make persons introverts. It is true they do not provide as much opportunity for team play as football, but its social values can be observed at a squad practice, a major relay carnival, or a conference cross-country run. Naturally it is more beneficial when the competition is followed by the mingling of competitors at a lunch or tea. Here all members of teams come to a better understanding of each other.

Training for cross-country has been a stimulus to many high school boys. It has encouraged them to study and practice a scientific diet and proper hygiene when otherwise they would have been uninter-

¹ Olds, L. W. *Track Athletics and Cross-Country*. A. S. Barnes and Company, New York, 1930.

ested. Experience has shown that cross-country is a very good builder of endurance and strength for the man of college age. There should be no excessive fatigue following a season if easy runs are taken daily and five-mile races run once each week. On the contrary, this considerable amount of running has proved very beneficial in the mile and half mile races of the winter and spring seasons. Much jogging and walking should be done at the high school age, but little competitive work.

The following suggestions should be valuable for a high school coach and long distance runner to keep in mind:

1. Promote only a two or two-and-a-half-mile cross-country race, since they are long enough for the high school boy.
2. Select only the boys who are normal in height and weight as well as those who have normal hearts.
3. Require a six weeks training period.
4. Do not make winning the only goal.
5. Lay out an easy, as well as pretty, course.
6. Provide regular practice and conditioning work.
7. Help each runner to enjoy his associates.
8. Do not permit the practice to become strenuous.

If these suggestions are followed there may be a place for cross-country in the high school physical education curriculum.

Running Form.—The running form in cross-country races varies with the terrain and contour of the course. A body-lean of more than ten per cent will ordinarily cause too much weight and strain on the legs. A lean of less than five per cent tends to retard the runner. It is obvious that more lean should be used up hill and less down hill. The arms should assist with an upward swing going up hill; they should be carried low going down hill. The hands should be slightly cupped but not clinched. The runner should land on the toes since landing on the heels throughout a rough five-mile course would result in body jolt and the accompanying bruises, aches, and pains. A shoe with a small padded heel, however, might be advisable for those who have a tendency to strike the heel on the ground. Shorter spikes may be worn because turf offers more footing than the loose cinders of a track.

Racing Tactics.--All cross-country runners should realize the value of teamwork in a team championship. Since certain members may need encouragement along the way, morale will be added if the team is well bunched. The member who is trailing has too much opportunity for discouraging thoughts. It may be good strategy, there-

fore, if the exceptional runner holds back the leaders to suit the pace of the average runner on the team. After a majority of the team has arrived to within a mile of the finish, it is advisable for each man to run it out for himself.

Running Over Hills.—It should be clear even to the beginner that to learn to run well over hills, it is necessary to practice on hills. No runner ever learned to run them by practice on the flat. After a preliminary conditioning period of several weeks the aspiring cross-country runner should find a hill and run up and down it several times.

In *going down hill* he should attempt to relax with the arms swinging freely. No effort should be made to slow down the pace other than to keep the balance. It is essential to watch for holes to guard against turned ankles. As the runner comes out onto the flat, he should learn to float or coast in place of slowing down the pace too rapidly, since more energy might be used in slowing down than is spent in retaining some of the speed of the descent.

In *going up hill* it is wise to cut down a little on the length of stride and swing the arms upward. This will bring the knees higher and will give more strength to the stride. *Most boys have a tendency to go off the top of the hill slowly, therefore, it is wise to coach them to pick up some distance by resuming their flat course running stride quickly.* Another way to pick up distance is to speed up as soon as one's competitor is out of sight. Such an opportunity might present itself after rounding a corner obstructed by bushes, with a lead of fifty yards. A follower has a tendency to speed up when the leader does keep the distance the same. If the latter does not see the acceleration in pace, he is bound to lose some ground. If the front runner gains another ten yards, the follower may become discouraged and begin to consider those behind him while the leader goes on to win easily.

The Training Schedule. Early Season.—The work should be with only a mile jog each night the first week. The second week there should be some variation with two-mile jogs. The third week should be spent in running distances up to three miles. Although the runner may report with stiff muscles each night, he should work out that stiffness during the following practice until sufficiently advanced in his conditioning that no stiffness results.

After a month of training a schedule similar to the following can be used:

Monday—Warm up, calisthenics, followed by six miles at a slow pace.

Tuesday—Three miles at competition pace for pace judgment.

Wednesday—Four miles at a comfortable pace.

Thursday—One mile for pace. Finish with a four-mile jog.

Friday—Rest.

Saturday—Five-mile time trial or meet competition.

Following this type of work and after a few races have been run the training schedule should be altered to fit individual needs. Some men will do better with much work while others will require a minimum throughout the week. One desirable method of figuring the daily schedule is by studying the weight charts of each man.

QUESTIONS FOR DISCUSSION

1. What are the most popular distances in the longer races?
2. Can you name a few things that might be reasons why certain men can run long distances, whereas others become fatigued very quickly?
3. Do you think a distance man can be chosen partly by his pulse rate?
4. What other factors should be considered?
5. What is meant by "semi-flat" foot action?
6. Can you suggest certain other activities that might aid rather than hinder training?
7. Suggest a good general weekly schedule rule to follow in training the two milers.
8. Would you train your men to run fast quarters?
9. Which of the two scoring methods given for cross-country do you prefer?
10. What do you say about cross-country for high school athletes?
11. Can a normal heart be harmed by vigorous activity? What about a boy who has never had a physical examination?
12. Name and describe two racing tactics to practice while out on a hilly course.
13. Would you recommend a quick change of pace? Do you think it better to figure the total time required by the runner and divide by the number of quarters and add a forty yard sprint on the start and a two hundred yard sprint on the finish?
14. Plan to remember a few good competitors who are running at the present time.

TEST QUESTIONS

- T F 1. The work of the leg muscles in long distance running may be more evenly distributed by means of a ball-heel landing of the foot.
- T F 2. In the distance races it is considered good form to keep a uniform pace.
- T F 3. A distance runner, by careful practice, may learn to judge his pace within a second for each quarter mile.

- T F 4. When approximately 300 yards from the finish the two mile runner should attempt to sprint the remainder of the distance.
- T F 5. The high score wins the team championship in cross-country running.
- T F 6 More body-lean should be used in going down hill and less body-lean should be used in going up hill.
- T F 7. A body-lean of more than 10 per cent in long distance running is likely to tire the legs unduly.
- T F 8. Every effort should be made in down hill running to slow down the pace.
- T F 9. After coming down hill the cross-country runner should slow down the pace immediately upon striking flat ground.
- T F 10. In going up hill the length of the stride should be shortened.

CHAPTER 4

GIVE ALL RUNNERS A CHANCE

Relay racing in the United States has been limited almost exclusively to runners. The popularity of this type of racing is indicated by the number of meets which have been organized in the past few years. The Drake, Pennsylvania, Kansas and Texas Relays have done much to make the early spring an interesting season for many members of the college teams.

While interest in relay racing has been of comparatively long standing, only recently has there been team competition in the field events. For example, in a recent dual meet between the British Empire and the United States, field men, as well as runners, competed in teams. There were three men on each field event team. The total height or distance of three men on one team was compared with the total score of the opposing team in such event. It can readily be seen that in this way the poorest man of the three is often an important factor in winning. For example, if the British team had included three broad jumpers with individual performances of 24 feet; 23 feet, 6 inches; and 22 feet, totaling 69 feet, 6 inches; and the United States had one outstanding man who could jump 25 feet, and two 22-foot jumpers, totaling 69 feet, it would be necessary for the poorest British jumper to make 22 rather than his customary 21 feet.

It is unfortunate for track as a sport and for the competitors themselves that so few dual, triangular, and quadrangular meets are run off in this way.

Relay Racing Rules.—Certain general rules apply to all relay racing. Some of them are listed.

No man, for example, may run more than one section of the race.

Each man must pass the baton to his teammate within the passing zone. (Diagram 142).

If the passer drops the baton, he must pick it up and pass it to the receiver within this zone.

The passing zone extends 10 yards on either side of the finish line for the section. This gives a distance of 20 yards in which to pass the baton.

The baton is usually made of a hollow cylinder of wood about one foot long and weighing about two ounces.

THE QUARTER-MILE RELAY.—The quarter-mile relay is the shortest race included on the major relay programs. Success requires speed in running and skill in passing the baton.

Methods of Passing the Baton.—There are two general methods of passing the baton. They are the sprint or blind method and the safety or visual method. More than one technique has been used successfully, under each of these two general methods.

The Blind or Sprint Pass.—In the short relays, while the safety factor is important, speed of passing is paramount. The following method is recommended as one of the best for the quarter-mile relay.

Each receiver should take a position on the line at the near end of his passing zone. This position should be a fast starting one with the

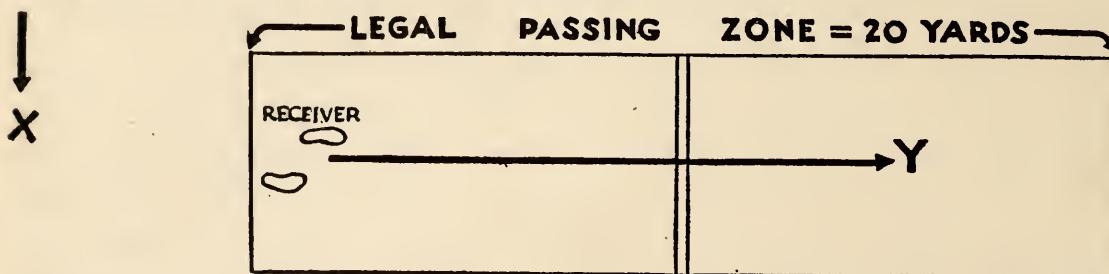


DIAGRAM 142.—The legal passing zone; the position of the receiver, while waiting his start until his teammate reaches point (X); and the approximate point of transfer, (Y), of the baton in relay racing.

body facing forward, with toes pointed ahead, and with one foot in advance of the other. He must be certain that he is in the correct lane. The receiver should locate a spot from 5 to 7 yards down the lane toward the oncoming teammate. The exact distance should be determined in practice. He should watch his spot until the passer strikes it, at which moment he should turn his head and run as fast as he can. As he runs he should place his hand in position to receive a sprint or non-visual pass. This is done by placing the finger tips of his right hand on the top of his right hip bone. The hand should be cupped, with the palm facing upward, and the thumb pointing forward.

This places the responsibility of passing upon the passer, but he should be in good enough physical condition after a short dash to make an accurate pass. In addition this method of holding the hand by the receiver presents an excellent target for him. If the team is to win a short race of this type, it must not be necessary for the receiver to slow down or look back. If the practice has been effective and if conditions have been checked, the passer should complete the exchange by a



Keystone (FPG)

The Western Roll high jump. The jumper has approached from the left and taken off the left foot. Note (right): how the right leg and arm lift the body; the lay-out parallel to the bar (center), the crossed-position of the legs; and the left arm and shoulder.



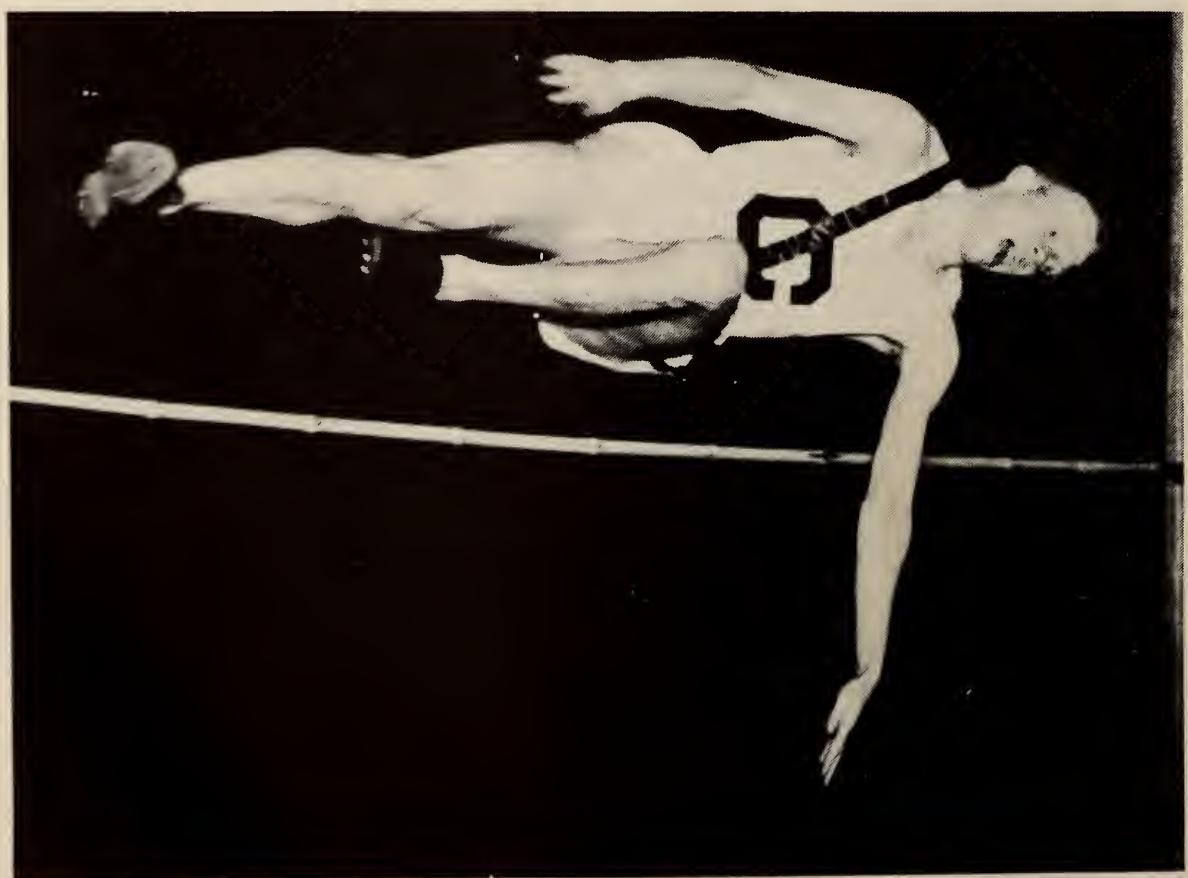
Keystone (FPG)

Eastern high jump form. The jumper (Spitz, New York University) gets his lay-out with his body *perpendicular* to the bar. He is jumping *away* from the camera.



Eastern form. The jumper (Spitz) is jumping toward the camera.

Keystone (FPG)



Keystone (FPG)

Western Roll form. Note the lay-out parallel with the bar. Charles R. Scott of Cornell.

Pole vaulting technique. The vaulter has just taken off the left foot, as the right swings forward—upward. This is the up-swing part of the vault. (George Varoff)

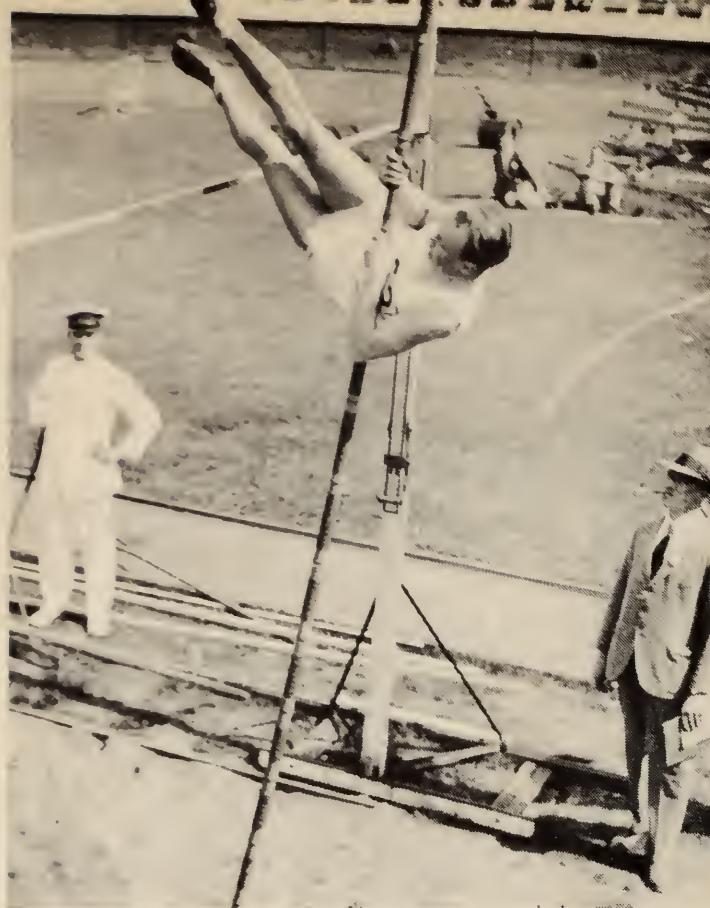


"Pic" (FPG)



Pole vaulting technique. This is the *pull-up* phase of the vault. The body is swinging up to the right of the pole. (George Varoff)

"Pic" (FPG)



Pole vaulting technique. The vaulter is turning his body to the left as he begins to *push-up* along the pole. The hands are not together in gripping the pole, a common fault among vaulters.

Keystone (FPG)



Pole vaulting technique. This is the *push-off* stage of the vault following a *jack-knife* action of the body in clearing the bar.

Keystone (FPG)

downward swing of the left hand as the receiver is about two or three strides from the end of the zone. (Figure 60).

As soon as the receiver gets the baton he should transfer it immediately to his left hand where it is ready to pass on to the next teammate.

Some coaches teach the receiver to get down "on his marks" in

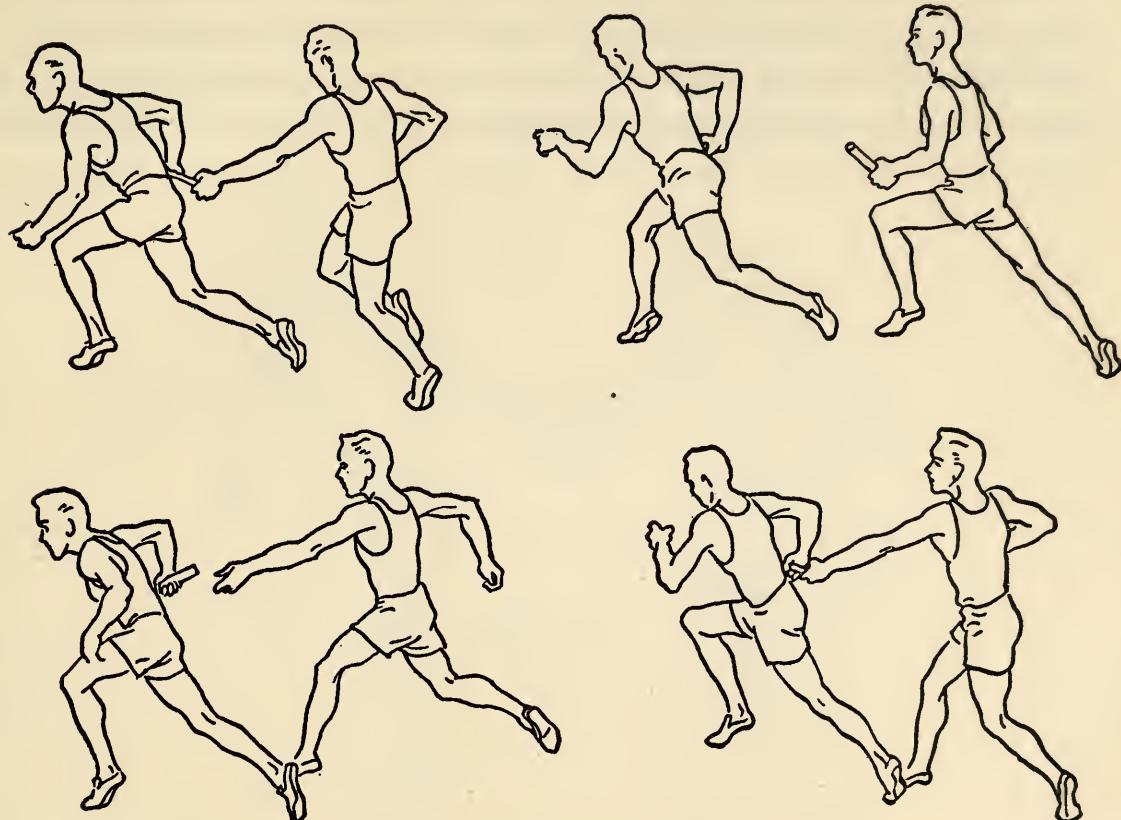


FIG. 60.—The blind or sprint method of passing the baton. Sequence of movement above: upper right, upper left, lower right, and lower left. The receiver may place the finger tips of his right hand on the tip of his right hip bone, with the hand cupped, palm facing upward, and thumb pointing forward. Or he may place the right thumb on the hip, with the fingers pointing downward, and elbow pointing to the rear.

sprint start fashion with his back to the oncoming passer. He starts on a signal from the passer.

Another Blind Pass.—A variation of the blind speed pass may be preferred. The receiver may place the right thumb on the hip, with the fingers pointing downward and the elbow pointing to the rear. The passer lifts the baton up along the side of the body until it strikes the thumb and palm. (Figure 60).

Placing the Men.—Each man on a relay team is said to run one leg of the race. It is usually run in lanes with the starting places "staggered" as described in a previous chapter for the quarter mile.

The man selected to run the first leg should be the fastest starter from the crouch position. He should hold the baton in the last three fingers of his left hand so that he may use his thumb and index finger to push against the ground in the start. The man with the fastest driving finish should run the last or anchor leg with the poorest man probably running the second leg of the race.

Other factors may alter this placing of runners. An early lead is often advisable on an indoor track since it is difficult to pass on a narrow track. Moreover, some runners become easily discouraged if behind, i.e., they are excellent front runners, while others delight in cut-



FIG. 61.—Another type of non-visual pass.

ting down a lead. Experience and practice will determine which arrangement is best.

THE HALF-MILE RELAY.—The half-mile relay is also run in lanes. The speed or blind pass described for the 440 relay may be used, if the team is composed of good strong finishers. Another method, however, may seem to be preferable.

The Visual Speed Pass.—Since some runners falter somewhat after a hard sprint of 220 yards it may be advisable to avoid the blind pass and employ a somewhat safer method of transfer. In one type of exchange the receiver should take his usual position in readiness to run while watching his approaching teammate. He should extend his right hand to the rear with the palm opened downward toward the track. *At the same time he should keep his eyes focused on the baton and the passer.* The latter should reach forward when he gets in pass-

ing distance and lift the baton into the waiting hand of the receiver. This is not the safest possible method of transfer but some safety must be sacrificed for speed in the exchange. (Figure 62).

THE ONE-MILE RELAY.—The mile relay is by far the most popular of all the relay events. It is a high point on the program of all major relay carnivals and is also the last event on the dual meet program.

Pace Judgment.—In the 440- and 880-yard relays speed, rather than pace judgment, was the essential element. As was stated in the discussion of racing tactics for the quarter mile, energy conservation is imperative in a race of this length. Since each member of the mile



FIG. 62.—The safety or visual method of passing the baton.

relay team must run 440 yards strength and energy must be present for the last stretch drive and a successful transfer of the baton.

The Pass.—The pass described for the half-mile relay is also recommended for mile relay racing.

THE TWO-MILE RELAY.—Since it is difficult for small schools to find four good half-milers, the two-mile relay is not as popular as some of the shorter races. It is on the programs, however, of all the major relay meets of the nation.

The Safety or Visual Pass.—The method of passing the baton in the two-mile relay must be a safe one for at least two reasons. In the first place, the passer may be too exhausted near the end of a half-mile run to execute a blind or sprint pass successfully. It will be necessary, therefore, for the receiver to assume the responsibility of safe

transfer and actually take the baton from the passer. Secondly, each runner in a race of this length has more time to recover the distance lost by a slower and safer method of passing.

The receiver should take the usual position and watch his approaching teammate. His arm should be extended backward with the hand opened palm upward and outward. The thumb should point toward the rear and the elbow toward the ground. He should judge the physical condition of the passer and time his start accordingly. It is his duty and responsibility to get the baton.

THE FOUR-MILE RELAY.—This race has not been popular in recent years and is being gradually replaced by the one-mile team race.

THE MEDLEY RELAYS.—Medley relays may be made up to include different distances at the discretion of the manager of the meet. They may include:

The Sprint Medley: 1 mile: 440, 220, 220, 880

The Middle Distance Medley: $1\frac{1}{8}$ miles: 440, 220, 880, mile.

The Distance Medley: $2\frac{1}{2}$ miles: 440, 880, $\frac{3}{4}$ mile, mile.

The Shuttle Hurdle Relays	220 yards 55, 55, 55, 55 440 yards 110, 110, 110, 110 480 yards 120, 120, 120, 120
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In most cases it will be found that the outcome of the race depends largely upon the ability of the man running the longest distance. Small schools, which are unable to find four men running the same distance, may be able to bring together a very good medley team.

QUESTIONS FOR DISCUSSION

1. Explain how competition may be promoted by field event teams.
2. Learn the several rules governing relay racing.
3. What are the two general methods of baton passing?
4. Describe one of the blind or sprint baton passes. Be prepared to demonstrate this pass.
5. What factors should be considered in placing the men on a relay team?
6. Demonstrate and describe at least one safety or visual method of transferring the baton.
7. List several medley relays and indicate the various distances involved.

TEST QUESTIONS

- T F 1. In a recent dual meet between the British Empire and the United States, field men, as well as relay runners, competed in teams.
- T F 2. The passer must hand the baton to the receiver within the last half of the passing zone.

- T F 3. A member of a relay team may not run two consecutive legs of a relay race, but he may run the first and third, the second and fourth or the first and last leg.
- T F 4. If the passer drops the baton, he must pick it up and pass it to the receiver within the passing zone.
- T F 5. The passing zone is 30 yards in length.
- T F 6. In a sprint or blind pass the responsibility for a successful transfer is on the passer.
- T F 7. In a safety or visual pass the responsibility for a successful transfer is on the receiver.
- T F 8. A right handed relay runner should carry the baton in his right hand.
- T F 9. The sprint medley relay is one mile in length and includes the 440, 220, 220, and 440 yard legs.
- T F 10. The distance medley relay is two and one half miles in length and includes the 440, 880, $\frac{3}{4}$ mile, and mile legs.

CHAPTER 5

OVER THE HURDLES WITH THE CHAMPIONS

Hurdling is one of the most spectacular events of the track and field program. It is a form event which demands exactness in rhythm and timing. It is almost incredible that the hurdler's time is only slightly slower than the sprinter's time. In fact, a champion low hurdler's time is faster than the time of an ordinary 220-yard runner. Such speed is possible today because hurdling now consists of stepping or striding over, rather than jumping over, the barriers.

Qualifications.—While hurdling is an event requiring excellent form, something more than skill in clearing obstacles is necessary to be a winner. The hurdler should possess the speed of a sprinter, the endurance of a quarter miler, the spring of a jumper, and the courage of a boxer.

THE HIGH HURDLES.—The high hurdle race is 120 yards in length in both high school and college competition. The standard height has long been 42 inches, but recently the National Federation of State High School Athletic Associations recommend a 39-inch height for interscholastic races. This height has now been adopted by many states. The spacing of the hurdles is shown. (Diagram 143).

	Start	1	2	3	4	5	6	7	8	9	10	Finish
120 Yd. High Hurdle	Strides.....	7 or 8	3	3	3	3	3	3	3	3	3	Sprint
	Yards.....	15	10	10	10	10	10	10	10	10	10	15

DIAGRAM 143.—The number of yards and strides between barriers in the 120 yard high hurdles.

The hurdle should be at least 3 feet 6 inches wide and built in the form of an L in place of the former T type.

Physical Characteristics.—The best high hurdlers usually are six feet or over in height, they weigh from 150 to 185 pounds, and invariably they have long legs. The latter are almost indispensable. Timing and rhythm are very important in getting the lift, in clearing the hurdle, and in synchronizing arm and leg action.

One would expect a sprinter to make an excellent high hurdler but seldom is this the case due to the fact that many dash men are short, thick muscled, stocky individuals.

Hurdling Form.—It is of paramount importance that the hurdler learn the correct start, determine the number of steps to the first barrier, acquire the technique of clearing the hurdles, and develop the proper stride between each obstacle.

The Start.—The technique of executing the start from holes or blocks should be the same as described for the sprints unless the hurdler finds it necessary to reverse the foot positions. If he leads with his right leg and can get to the take-off spot in eight strides, he can assume a position "on the marks" with the left foot forward.

Striding to the First Hurdle.—While many good hurdlers, when questioned, cannot recall how many steps they take to the first hurdle, observation shows the average is eight strides. This is illustrated in Diagram 144. Some runners, however, take only seven steps, while

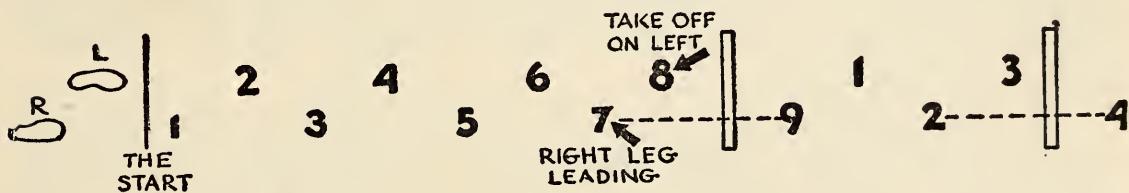


DIAGRAM 144.—This shows the position of the feet for the high hurdle start with the right foot back; eight strides to the first hurdle with the right leg leading and the take-off on the left foot; and three strides between hurdles after the landing.

short legged or immature boys may require nine, although the latter is too slow for championship class. Just as in sprinting the length of the strides gradually increases.

Clearing the Hurdle.—At the eighth stride the hurdler should take-off or spring from the rear foot to clear the barrier. At the same time, he should throw the lead leg forward and upward with the toe pointing up and the knee as straight as possible without tension. Simultaneously, with these two movements the body is dipped forward until the chest almost touches the knee. As the lead leg is swung forward, the opposite arm is also swung forward and upward, with the hand frequently touching the toe of the lead leg. This synchronizes arm and leg action. (Figure 63).

As the hurdler moves forward he rocks up on the toe of the rear leg. It is then fully extended and finally snapped up over the barrier. If properly executed the trailing leg should form two right angles, one between the thigh and leg, the other between leg and foot. The knee

and toe should point out to the side, the thigh should be parallel to the top of the hurdle and the heel should be close to the hip. The opposite arm should move forward vigorously in unison with the trailing leg.

When the leading foot is within a few inches of the top of the hurdle it should be snapped down sharply so it will land on the ground as close to the hurdle as possible on the far side. It should barely clear the hurdle as it goes over. If this is not done the hurdler will tend to "sail" over the hurdle. Time spent in sailing through the air adds to the time of the race. The hurdler, therefore, should get his foot back on the ground for propelling force forward at the quickest possible moment. The foot should be slapped down on the ground in a downward, backward pawing motion. It should land running or moving backward at the same rate of motion the body is moving forward. The opposite arm should move back in unison with the lead leg. *It is very important that the center of weight of the body be directly over or slightly ahead of the landing foot as it strikes the ground.* If this is not the case, the speed of the hurdler will be materially checked. (Figure 63).

The distance from the take-off to the first hurdle is approximately 7 feet or slightly more, while the lead foot lands about 5 feet beyond the barrier. After full speed is attained the distance of the take-off from the hurdle will be increased to approximately $7\frac{1}{2}$ feet while the landing distance will correspondingly decrease to about $4\frac{1}{2}$ feet.

The Stride Between Hurdles.—There should always be three strides between the high hurdles. There will be four foot marks, however, if the landing is counted. These strides should be of equal cadence but they will not be of equal length. After the take-off and landing distance is deducted from the 30 feet between hurdles there will be about 18 feet remaining to be traversed in three steps. This requires an average of 6 feet per step but observation will show that the first stride is several inches short of 6 feet, and the third is several inches over 6 feet in length.

The eyes should be focused up the track rather than on the next hurdle, so the variations necessary in the length of the strides can be judged well in advance. Needless to say, the hurdler should never look to the side but should concentrate constantly on the barriers in front of him.

The Finish.—The finish of the high hurdles, after the last barrier is cleared, is similar to the finish of the sprints.

Conditioning Routine.—The early season training should be

similar to that of a sprinter. There should be much light running, calisthenics and muscle stretching and special exercises designed to develop suppleness in the muscles used in hurdling.

Special Exercises.—One of the best special exercises is known as "The Top of the Hurdle." This includes sitting on the ground in an

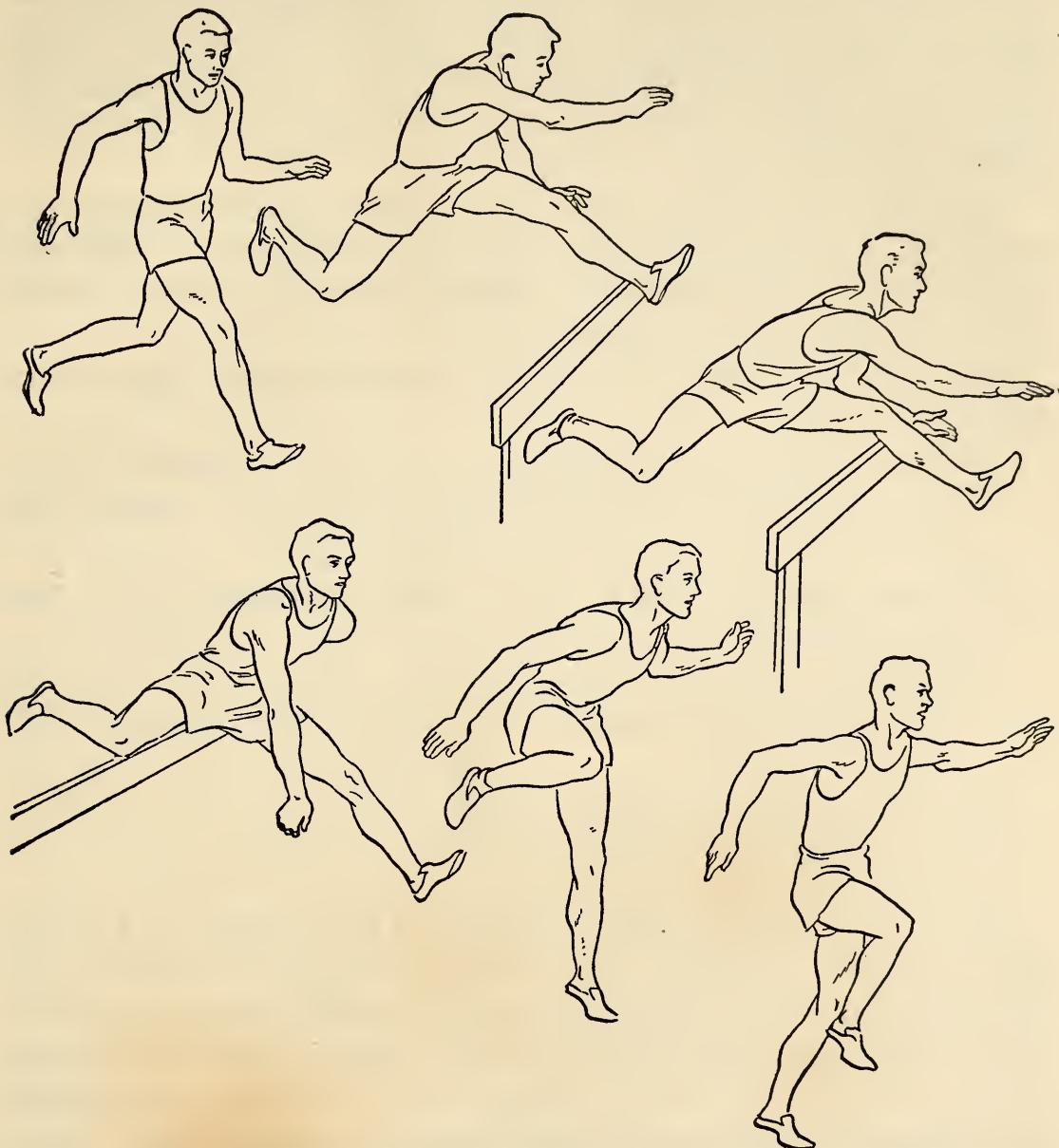


FIG. 63.—Hurdling technique. Note the synchronized arm and leg action with the right arm and left leg forward (upper center and upper right). Note also how the legs, first the left, then the right, are snapped down after clearing the bar.

"over the hurdle" position with the chest, the arms, and the lead leg forward, and the trailing leg flexed behind. This exercise should be done mildly at first and more vigorously as the season progresses.

The exercise called "Inverted Hurdling," is also valuable practice. The hurdler first lies on his back, then extends his legs and trunk up-

ward until he rests on his head and shoulders. In this position, the hurdler does a form of bicycle movement or inverted running. He executes the first eight strides, leads with one leg, and trails with the other, and then runs three strides, etc. This assists in developing proper cadence as well as suppleness.

The best exercise, of course, is actual hurdling over one or two practice hurdles. A padded top bar or a light cross stick will reduce the chances of irritating bumps and abrasions. The heels should be protected by sponge rubber and the knee and ankle of the trailing leg should also be protected.

It should be noted here that there seems to be less tendency for hurdlers to pull leg muscles than is the case with sprinters. This may be due to the fact that the hurdler usually spends more time in stretching and conditioning his leg muscles.

Practice Schedule.—The practice schedule should approximate the following plan.

Monday: Warm up by jogging, 10 minutes of exercises, 3 or 4 practice hurdles, 5 or 6 starts with the gun, a few minutes rest, and the full hurdle distance at about $\frac{9}{10}$ speed.

Tuesday: Sprints of from 30 to 50 yards and form practice over several hurdles.

Wednesday: About the same as Monday. Run about half the distance several times against time. Finish with a long sprint of 150 yards or more.

Thursday: A few practice hurdles for form.

Friday: Only a shower bath and rest.

Saturday: The race.

THE LOW HURDLES.—The standard low hurdle race has long been 220 yards in length. This is still the distance for the colleges. Recently, however, as stated for the high hurdles, scholastic authorities have recommended a distance of 200 yards for high school competition. The purpose of this change was to eliminate some of the stride difficulties encountered in this event by immature boys. In the 220-yard event there are 10 barriers 20 yards apart with 20 yards from the start to the first hurdle and also 20 yards from the last hurdle to the finish line (Diagram 145). In the 200-yard event there are 10 hurdles but the distance between them has been reduced to 18 yards, with the same distance from the start to the first hurdle (Diagram 145). The distance from the last barrier to the finish line remains at 20 yards.

Some high school coaches feel that the 18-yard distance is too short and would compromise with 19 yards. Experience with the various

lengths should eventually solve the problem and determine the optimum distance.

Physical Types.—Many high hurdlers, as well as sprinters, run the low hurdles. Speed is more valuable in this event than in the high hurdles and the same degree of suppleness is not required.

Low Hurdling Form.—The start of this race is similar to the start of the sprints or the high hurdles. The number of strides to the first hurdle is usually ten, but some good college hurdlers use eleven,

	Start	1	2	3	4	5	6	7	8	9	10	Finish
220 Yd. Low Hurdles	Strides.....	10	7	7	7	7	7	7	7	7	7	Sprint
	Yards.....	20	20	20	20	20	20	20	20	20	20	20

	Start	1	2	3	4	5	6	7	8	9	10	Finish
200 Yd. Low Hurdles	Strides.....	10	7	7	7	7	7	7	7	7	7	Sprint
	Yards.....	18	18	18	18	18	18	18	18	18	18	20

DIAGRAM 145.—The number of yards and strides between barriers in the 220 yard low hurdles (above), and the 200 yard low hurdles (below).

and in the scholastic race where the distance has been reduced 2 yards only nine steps may be needed.

The take-off for the low hurdle is usually farther away than that for the higher barrier and the landing is closer. The body-lean is not so great and is more uniform throughout, the spring up is less pronounced, and the trailing leg is carried over in more nearly running form. In other words, this race requires more of a stepping action than the high hurdle race. For this reason, too, the knee of the leading leg is not lifted so high and more variation in arm action is permissible.

The usual number of strides between low hurdles is seven. The contestant who must take eight strides is forced to alternate, i.e., lead first with one leg, then the other. Another variation may be the addition of two strides making a total of nine between barriers. This requires shorter steps and a faster cadence. Both variations are likely to reduce the speed to such an extent that championship time is impossible.

Practice Schedule.—The low hurdler will find it necessary to do some longer distance work to build up sufficient endurance for this

gruelling race. This may be done by running through the full flight of low hurdles on Wednesdays, with a 300-yard sprint on Thursdays.

Common Mistakes in Hurdling.—A list of some of the more common mistakes may be helpful to the beginner.

1. Failure to gain full speed upon reaching the first hurdle.
2. Over-striding or under-striding.
3. Going to high over the first hurdle.
4. Rotating the lead foot sidewise.
5. Turning the body to the side in approaching the hurdle.
6. Failure to use the arms vigorously.
7. Side winging of the arms.
8. "Sailing" over the hurdle.
9. Looking back or to the side.
10. Undue tenseness.
11. Failure to cut the lead leg down close beyond the hurdle.
12. Landing beyond the hurdle with the center of body weight behind the landing foot.

QUESTIONS FOR DISCUSSION

1. What are the physical qualifications necessary for championship performance in the high hurdles?
2. What are the number of strides necessary in approaching and in running between high and low hurdles?
3. Explain the form recommended in clearing a hurdle.
4. How can the hurdler determine what distance to take off from the barrier?
5. What factors must be considered before the high hurdler knows how to place his feet at the starting position?
6. What special exercises would you recommend for conditioning high hurdlers?
7. Draw up a practice schedule for a high hurdler. A low hurdler.
8. How does form in the low hurdles differ from that in the high hurdles?
9. What are some of the more common mistakes in hurdling?

TEST QUESTIONS

- T F 1. Recently the National Federation of State High School Athletic Associations recommended a 36 inch high hurdle for high schools.
- T F 2. The average number of strides to the first high hurdle is eight.
- T F 3. If the high hurdler leads with his right leg and can get to the take-off spot in eight strides, he can assume a position "on the marks" with the left foot forward.
- T F 4. As the lead leg is swung upward and forward over the hurdle the opposite arm should swing downward and backward.

- T F 5. After clearing the hurdle the center of weight of the body should be directly over or slightly ahead of the landing foot as it strikes the ground.
- T F 6. The number of strides between low hurdles should be seven.
- T F 7. Strides between the high hurdles should be of equal cadence but will not be of equal length.
- T F 8. High school authorities have recently recommended 200 yards as the distance for the scholastic low hurdle race.
- T F 9. In the 200 yard high school low hurdle event the distance between hurdles is 18 yards.
- T F 10. One common error in high hurdling is going too high over the first hurdle.

CHAPTER 6

HIGH IN THE AIR

The jumping events date back to antiquity, when primitive man used them in his search for food and in fights with his enemies. Jumping is a physical act which consists of springing into the air from one foot. In the high and broad jumps the hands and arms are used to some extent to help propel the body, but in the pole vault they are of fundamental importance in pulling the body up the pole. It should be noted that the three jumps most prominent on our track and field programs, and the ones discussed here, are jumps which follow a run.

While natural spring is a very valuable characteristic of a jumper, a high degree of skill is paramount if one is to compete in championship class today. And since skill is so fundamental, it is important for the athlete and the coach to take into consideration how skills are learned. Psychology teaches us that we learn by doing the act over and over again, that we learn best the thing we enjoy doing, that we should get an "insight" or a correct mental picture of the complete act, and that we differ as individuals and, therefore, react differently to various kinds of training.

THE BROAD JUMP.—The running broad jump has been an event in track and field competition in the United States for about seventy years. Since its beginning in this country the distance of the jump has increased from around 17 feet to the present record bordering on 27 feet. An increased participation in this event and better coaching techniques are probably the two most important factors in bringing out this remarkable improvement in broad jumping.

Physical Characteristics.—Of all the necessary physical attributes, speed is probably by far the most important. In fact, sprinters usually make excellent broad jumpers. The difference in distance between the standing and running broad jump is largely due to speed. Height, too, is a valuable asset since the tall man seems to be able to lift his body and legs higher in the air and stretch his feet farther on landing. The strength and ability to spring high off the board is also essential for high class performance.

Body build varies in this event, however, about as much as it does in the sprint. Hubbard of Michigan was of average height but strongly built, while Gordon of Iowa was tall with powerful legs. Both had a great amount of spring. Owens was of rather slender build and average height with the grace and speed of a deer.

The Shoes.—The most satisfactory shoes seem to be a modified sprint type with a counter of sufficient height to carry a sponge rubber heel pad and at the same time permit a comfortable heel fit. The high, stiff countered shoe with spikes in the heels is heavy and it prevents maximum foot leverage with the elevated heel. The regular sprint shoe without heel pads gives no protection against bruises and if heel pads are worn the shoe does not fit comfortably.

The Technique of Broad Jumping.—The technique of the running broad jump logically divides itself into four parts: the run up to the board or the approach; the take-off; the "high in the air" or the flight; and the landing.

The Run.—The run up to the board should be practiced until it is automatic. This can be accomplished by selecting a starting point and check marks, and by developing a standard stride to insure taking off with the jumping foot at the correct spot on the board.

The number of strides varies with individuals but is usually from 12 to 16, covering a distance of from 80 to 110 feet. The most common method is probably the 2-4-8 plan (Diagram 146). The first check



DIAGRAM 146.—The 2-4-8 plan of striding the run in the broad jump.

mark is placed 8 strides from the board, the second 4 strides beyond that or 12 strides from the board, and the third check mark, i.e., the start is 14 strides away.

If the jumper gains speed slowly he should probably use a 2-4-10 method of approaching the board. On the other hand, if he gathers speed quickly, he may need fewer strides than are proposed in the 2-4-8 plan. This can only be determined by careful practice.

Some system should be followed in establishing the location of the check marks. The jumper may start along the side of the pit and stride back down the run-way noting the foot prints and adjusting

them after several trial runs. Or the jumper may choose to establish the first check mark approximately 8 strides from the board then run through without jumping until it is properly located.

Regardless of the number of strides employed and the total distance of the run, the check marks will need to be established each day to conform to such varying conditions as high winds, rain, and hardness or softness of the run-way.

Like the sprinter, the running broad jumper gradually increases his speed and the length of his stride. During the last 6 or 8 strides nearly maximum speed should be attained. On the last one or two strides the jumper must gather himself for the leap off the board.

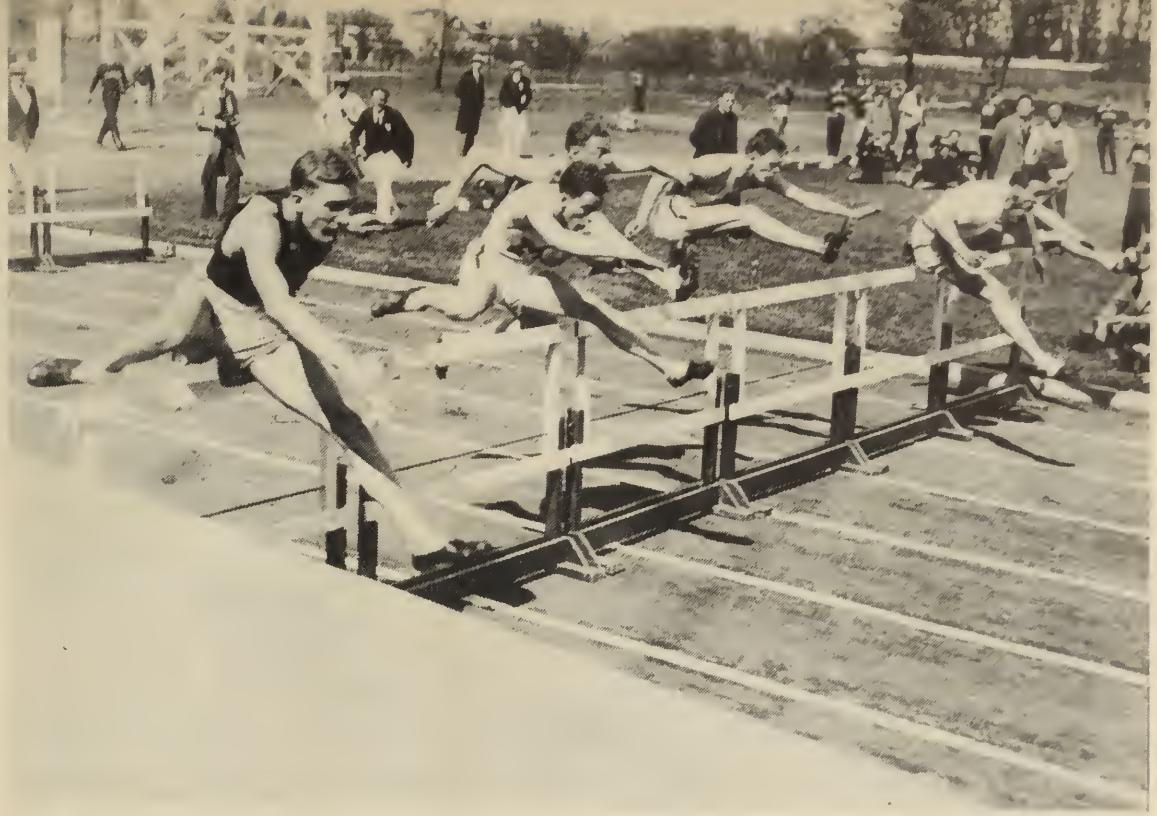
The Take-Off.—The jump is made from a 4 by 4 by 48-inch board into a pit. The jumper should strike the board flat-footed with either the right or the left foot, depending on his preference. If the jumper takes off from his left foot, he should slap or pound the board viciously with it in a flat-footed position and rock up from heel to toes as he straightens and extends the leg for the leap.

The broad jumper should be impressed with the importance of the location of his center of gravity in relation to his take-off foot. *The center of gravity at the moment of take-off should be slightly ahead of the point of application of power, i.e., the foot.* This is regulated by the length of the last stride before the jump. If the stride is too long the center of gravity will be behind the point of application of power and the jumper will fail to get proper height. Moreover, if the center of gravity is directly over the foot the tendency will be to jump upward, rather than forward-upward. The distance the last stride should be shortened will vary with jumpers, but it should be several inches.

As the take-off or left foot strikes the board, the left knee should be bent *slightly* as a part of the “gather” or “coil” for the spring. Simultaneously with the foot-stamp, rock-up, knee straightening and backward thrust of the left leg, the right leg and foot should be swung vigorously forward and upward. Moreover, the swing of the arms should be synchronized with that of the legs with the left thrust forcefully forward, upward and the right swung powerfully backward and downward. (Figure 64).

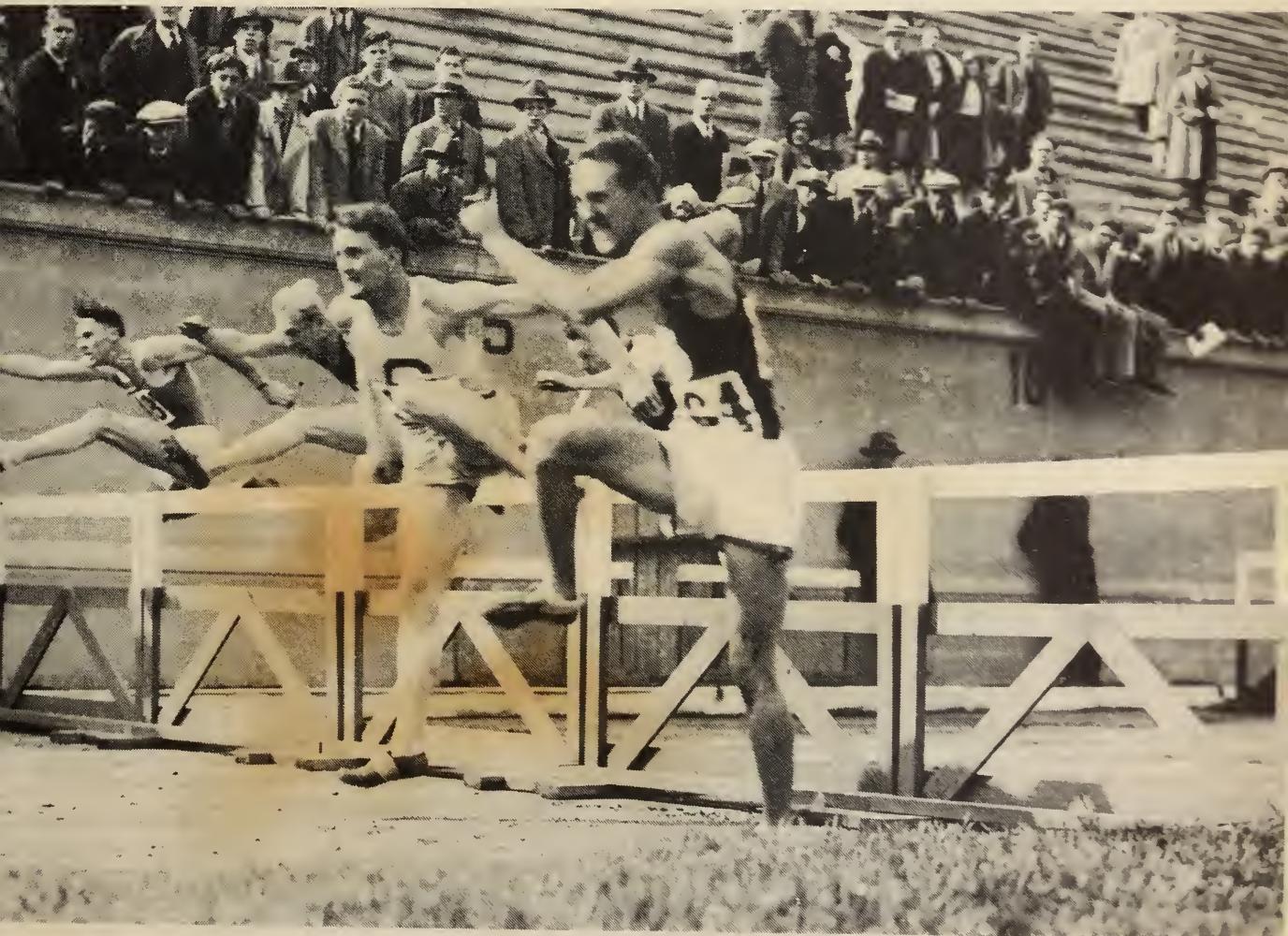
“High in the Air”—The Flight.—There are two common methods of executing the flight through the air from the board to the landing. One is known as the Hitch-Kick or Walk-in-the-Air method, the other is called the “Knee Bend” or “Sit-Down-in-the-Air” technique.

The Hitch-Kick or Walk-In-The-Air Method.—The “hitch-kick” or



Keystone (FPG)

This picture shows form over the hurdle and the snap down of the lead leg. The man nearest the camera demonstrates the right angles of the trailing leg at the hip, the knee and the ankle. Lee Sentman (second from right), University of Illinois, ties world's record.



Keystone (FPG)

The man nearest the camera has snapped down the lead leg so his center of gravity is over or beyond it when it strikes the ground.



Keystone (FPG)

One style of broad jump form. Note the height in the air and the peculiar body lean. (Jesse Owens)



Keystone (FPG)

This picture shows the "sit-down" position of the broad jumper preparatory to landing. The legs are being fully extended.

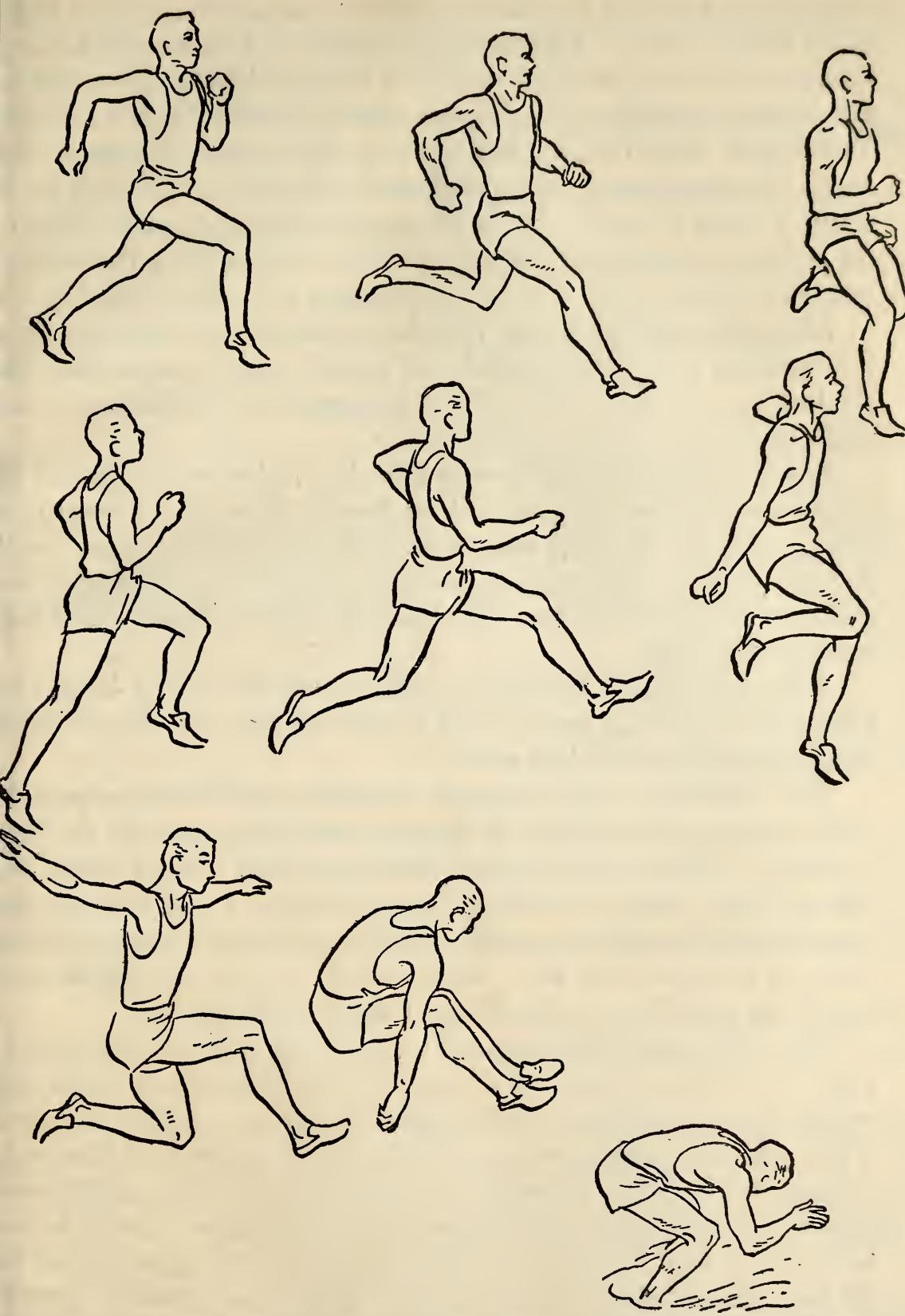


FIG. 64.—The broad jump. Note the sprint approach (upper series), the take-off and hitch-kick or walk-in-the-air form (center series), and the landing (lower series).

Walk-in-the-Air form is probably used by a majority of the top flight broad jumpers today. This technique consists of a walking or kicking motion in the air by swinging the free or right leg backward and downward after it completes its swing forward and upward at the take-off. The jumper should be careful, however, not to start this action too soon. It cannot be done in a co-ordinated way until the jumping leg is ready to swing forward. As the free or right leg comes back, the take-off or left leg should go forward. During the hitch-kick the body is nearly erect, and the arm action synchronizes with that of the legs.

After this walking motion both knees should be brought up in a bent position and then extended and straightened in preparation for the landing. As this is done the trunk should be bent forward at an angle of about 45 degrees. (Figure 64).

The Knee-Bend or Sit-Down-In-The-Air Method.—As indicated by its name in the knee bend method the jumper draws up his knees to a sitting position. His propulsion forward depends entirely on his speed and foot stamp. This method may not get quite the distance of the other but it is easier to learn. The body should be inclined farther forward in this jump.

In preparation for landing, in either method, the legs should be extended forward, the body should be inclined forward, and the arms should swing forcefully backward.

The Landing.—It is important to reach as far forward as possible with the feet without losing the balance and falling back on the hips or hands. Obviously, the jumper should not break ground nearer the take-off board than the break made by his heels. To prevent this the center of gravity of the body must be thrown forcefully forward in any way that seems to work best. Some skilled performers swing or turn to the side opposite the take-off leg as they hit the pit.

The Training Schedule.—The broad jumper, like the participant in any other event, must keep in physical condition. Jumping requires more endurance and practice than many novices imagine. There should be daily workouts with two days reserved for jumping. The other days should be spent in sprinting, low hurdling, calisthenics, and work on the rings in the gymnasium. Jumping shoes with heavy heels may be used in practice, but sprinting shoes with a sponge pad in the heel should be used in competition. Early season practice periods should be filled with sprints for speed, hurdle practice for uniform stride, easy striding for general condition, and rope skipping and high kicking for suppleness. The specific exercise of sitting on the ground

in the over-the-hurdle position which was described for hurdlers is recommended for developing suppleness.

Weekly Schedule:

Monday—Body building exercises; jogging or wind sprinting one or two laps; general loosening up work.

Tuesday—Exercises; take-off practice; jumping form only, not to exceed 6 or 8 jumps; jogging a lap.

Wednesday—Exercises; starts and short sprints; running over 3 to 5 low hurdles; jogging one lap.

Thursday—Exercises; take-off practice; form jumping.

Friday—Rest.

Saturday—Competition.

THE HIGH JUMP.—The running high jump, like the broad jump, has been an event in the track and field competition of this country for about seventy years. During that time the height has increased from approximately 5 feet 6 inches to 6 feet 10 inches or thereabouts. World records during this phenomenal improvement included Sweeney's jump of 6 feet 4½ inches in 1892 and Horine's jump of 6 feet 7 inches in 1912. The former athlete was largely responsible for the elimination of the old-fashioned scissors and the introduction of the so-called "Eastern" or "Sweeney" form of body lay-out when crossing the bar. Horine was the first record holder to use the so-called "Western Roll" in crossing the bar.

Present day jumpers are going as much as nine inches over their own heads. This phenomenal improvement is due to several factors including an intensive study of body mechanics, improved jumping facilities and equipment, and a more widespread participation in the event.

Physical Characteristics.—Most of the best high jumpers are tall and rangy. Speed is not so essential since the approach to the bar is relatively slow.

The high jumper must have, however, a great amount of leg spring and muscular co-ordination between various parts of the body. Co-ordination and rhythm are necessary for a change of body position while in the air. How these qualities are put into the best possible jump depends upon the technique employed.

Techniques.—There are three main techniques of high jumping: the scissors, the Eastern, and the Western Roll. The scissors method has been discarded since it was necessary, when going over the bar in a sitting position, to lift the center of gravity too high. The East-

ern or "Sweeney" style, and Western Roll or modifications of them are the methods employed today. The reason for this is obvious since the layout in these styles secures the greatest possible height with the least possible expenditure of energy.

The Western Roll.—Horine was the first world's record holder to use the Western Roll form of high jump. Beeson, a fellow Californian, soon surpassed Horine's mark with a jump of 6 feet $7\frac{5}{16}$ inches. Osborn later surpassed both marks with a modified Western Roll in which he introduced his "slide across the bar."

The Approach.—The angle of approach to the bar in the Western Roll is approximately 45 degrees. The number of strides varies but is

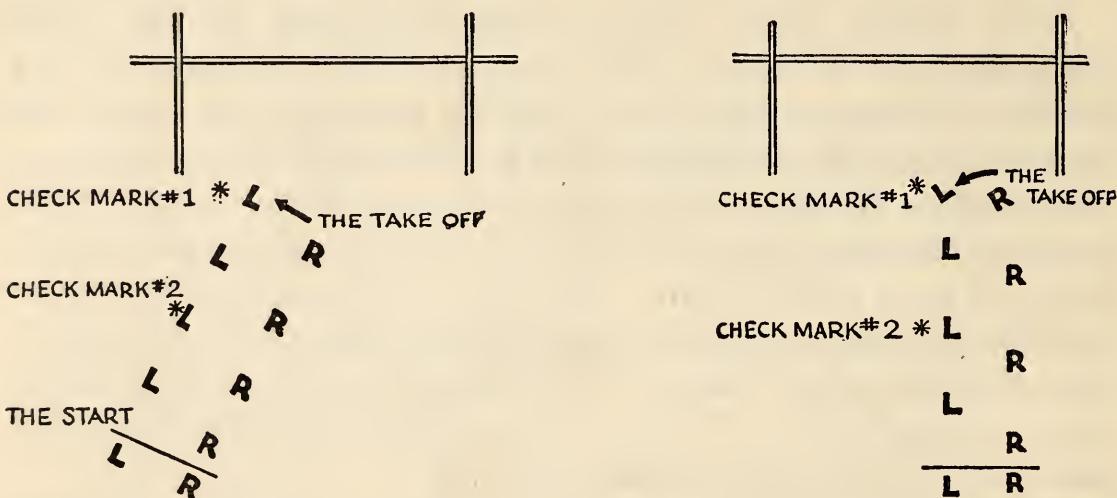


DIAGRAM 147.—The strides and check marks in the approach for the high jumps: Western Roll form (left); Eastern form (right).

usually eight or nine. Some jumpers use two, others three check marks.

The first one should be made at the take-off spot and may be found by standing near the bar and reaching out toward it with the arm and fingers extended. When in position where the finger tips barely touch the bar, the spot at the feet should be marked for the take-off. It will be approximately 3 feet out, but should be moved outward somewhat as the height is increased.

The second check mark should be made four strides or about 24 feet out from the first, and at an angle of 45 degrees. The third mark should be three or four strides farther out. (Diagram 147).

The first few steps should be relaxed and somewhat bounding, while the remaining ones are more vigorous to give drive, spring, and "gather" for the explosive lift. The amount of speed necessary for maximum results will have to be determined by experience, but the

jumper should keep in mind the fact that the high jump is an up-jump, not a broad jump. Energy, which might be expended in generating speed forward, should be conserved to provide a lift upward.

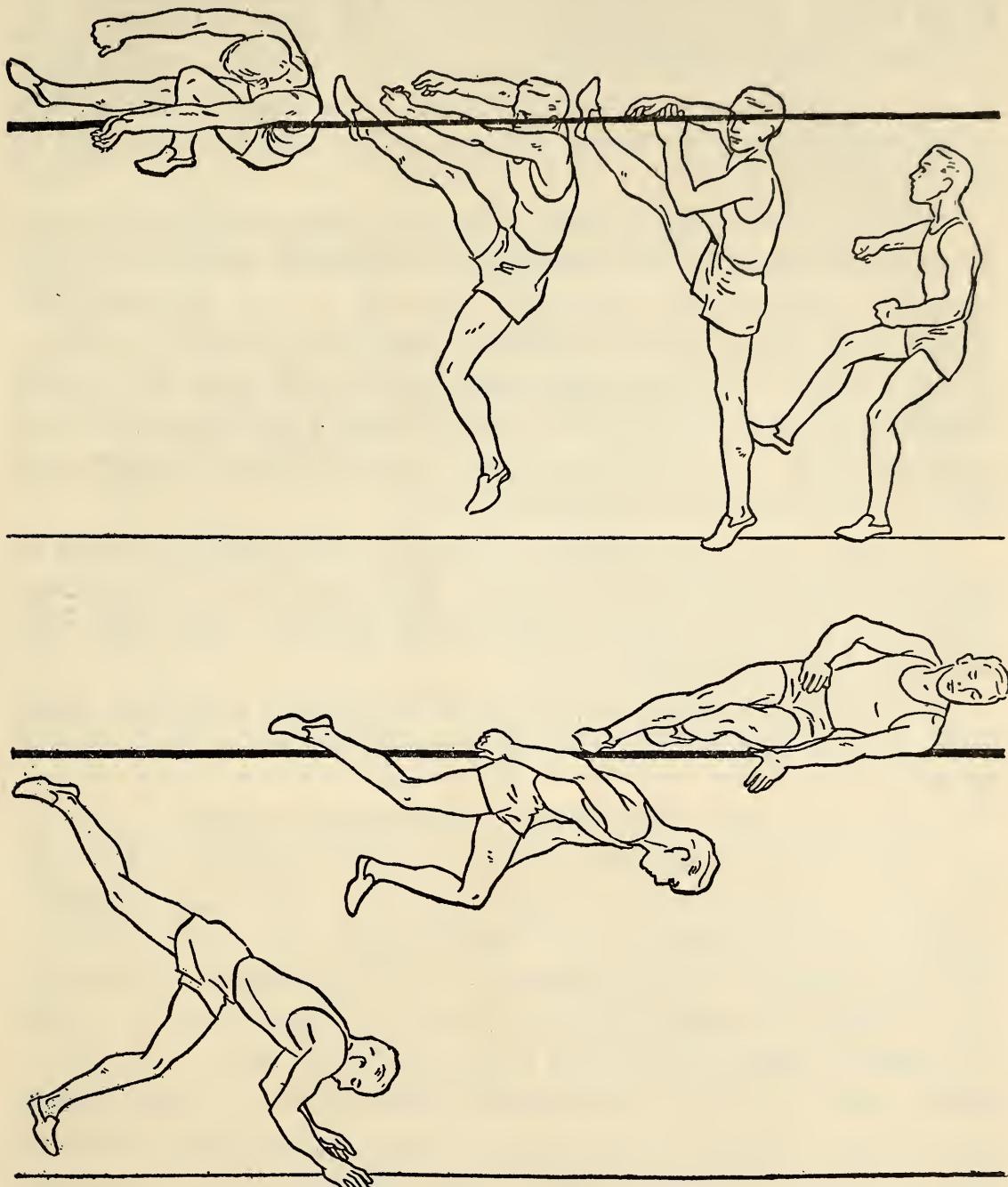


FIG. 65.—The Western Roll high jump. The take-off is from the inside foot. The body crosses the bar parallel to it.

It is obvious that the check marks will need to be adjusted to suit the nature and condition of the run-way, the velocity of the wind, and improvement of the technique. As soon as he reaches the second check mark, the jumper should watch the bar.

The Take-Off.—The take-off for the Western Roll is executed from the inside foot. The last stride before the take-off is lengthened somewhat to provide a greater arc for the up-swing of the outside or free leg. There is also a settling down, by means of a moderate knee bend in the take-off leg, in gathering for the upward spring. Moreover, the center of gravity is thrown back behind the take-off foot. This settling down, or gathering process is augmented by slapping the take-off foot on the ground in a flat-footed manner with a rock-up from heel to toes. (Figure 65).

After the left or take-off foot strikes the ground, assuming that the approach is from the left, the right leg should be kicked or swung vigorously forward and upward. The kick of this leg should be started with a bent knee. It tends to straighten near the completion of the upswing. Simultaneously, with this should come the forceful straightening of the knee and the rock-up from heel to toes of the left or take-off leg. *At this moment the center of gravity should move forward and directly over the take-off foot.*

To obtain the most powerful upward lift the arm action must be perfectly synchronized with the legs. As the right or free leg swings forward and upward the left arm must do likewise. The right arm, too, should assist in the lift.

As the take-off foot leaves the ground the knee and thigh begin to bend, until they should be almost completely flexed at the height of the bar.

Crossing the Bar.—The Western Roll jumper usually crosses the bar with a layout on his side; i.e., lines drawn through the hips and shoulders should be about at right angles to it. His body should be parallel to the bar as he goes over. The swing-up of the free leg should assist the jumper in turning the body. As the right leg crosses the bar the left should be brought up close under it in a bent position. As the left shoulder crosses the bar and begins its descent beyond, this action tends to raise the hips. Since the near or left hip is the most difficult part of the body to lift over the bar, the jumper should assist in raising it by throwing the left arm and the head backward and downward. The take-off leg, too, should be used to assist in getting the hips away from the bar by swinging it in a rotary backward arc.

The Eastern Form.—The Eastern form of high jump was so named because, for years, many of its exponents were in the eastern section of the United States. At the present time, it is employed wherever the high jump is taught.

The Approach.—The angle of approach to the bar in the Eastern

form is approximately 60 degrees. The jumper, if approaching from the right, should start toward the right standard and then turn somewhat to the left during the last few strides.

The check marks are determined in advance, and in the same manner as for the Western Roll. The take-off spot, however, will be about one foot farther out from the bar. The number of strides varies, but is approximately the same. (Diagram 147).

The speed of the approach in the Eastern style should be faster because the body crosses lengthwise to the bar, rather than parallel to it, as in the Western Roll. For this reason, and because, too, the take-off is farther back, the time consumed by the body in crossing the bar will be longer.

The Take-Off.—The turn in approaching the bar permits the take-off to be closer to it. The technique here is similar to that described for the Western Roll. The difference is that the spring up is made from the *outside* foot. Moreover, the swing up of the free or inside leg is more vigorous and pronounced. Both arms are swung upward to assist in the lift. (Figure 66).

Crossing the Bar.—In order to clear the bar the left or take-off leg must be snapped up vigorously. This movement should be synchronized and aided by a downward and backward swing of the right leg. This is followed immediately by a similar backward and downward kick of the left leg. This leg action gives the lay-out with the body at right angles and the leg parallel to the bar. Here again the left leg should be swung vigorously backward in a rotary motion to pull the left hip away from the bar and turn the body in preparation for the landing.

Other Forms of High Jumping.—While the Eastern and Western forms of jumping are the two standard methods employed today there are almost as many variations in them as there are jumpers.

One of the common variations is the modified scissors jump, but this form is not recommended because of the difficulty or impossibility in getting a lay-out.

In a variation of the Western Roll, sometimes called the Barrel Roll or the "Belly" Roll, the jumper faces the bar as he goes over. While this form is not in general use it is used by a few of the very best modern jumpers.

Still another variation of high jumping form is that modification of the Eastern jump, sometimes called the Reverse Sweeney or Nelson jump. Nelson approached the bar and started the up-swing in regular Eastern form, but cleared the bar with his back, rather than his side to

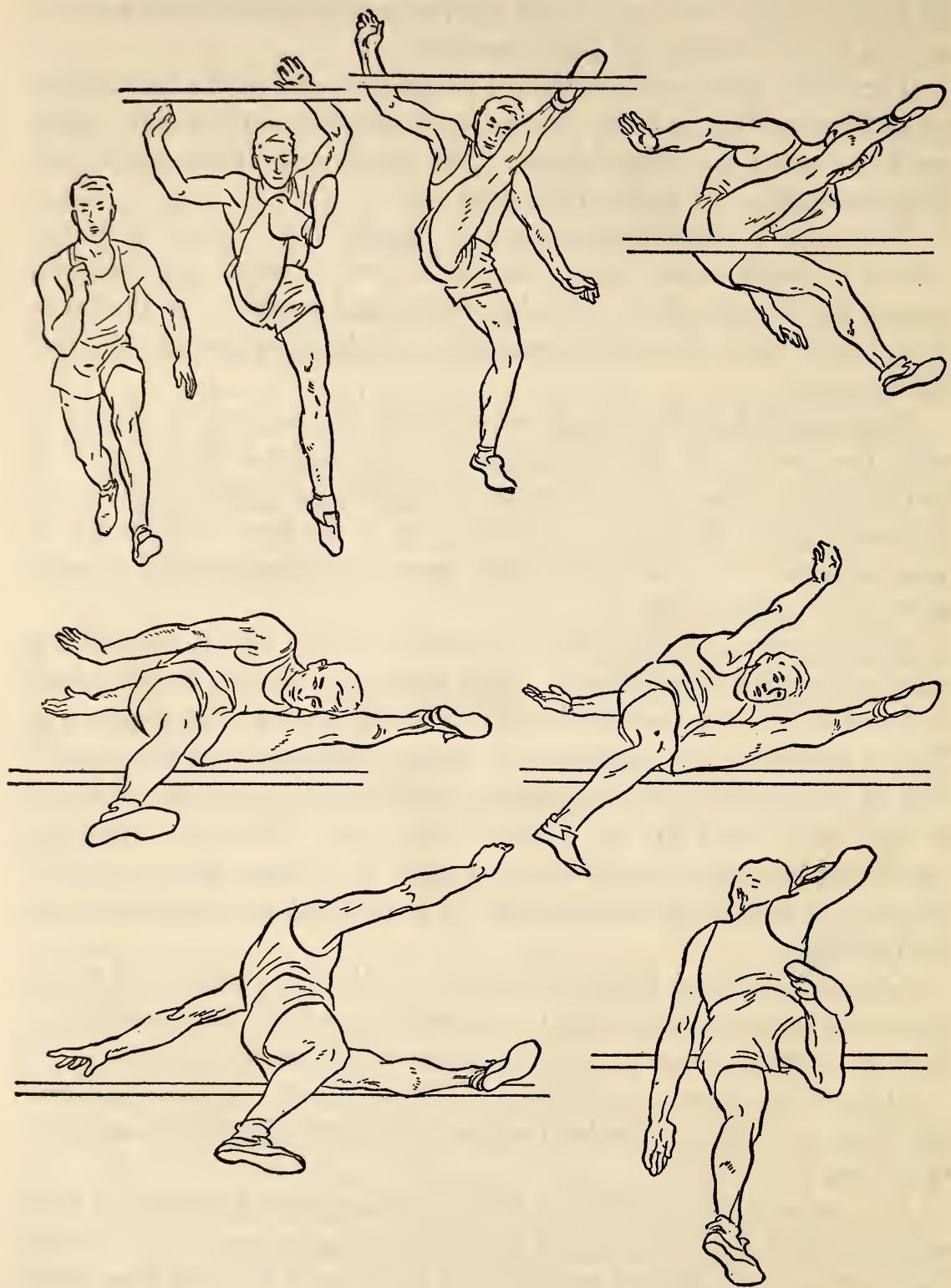


FIG. 66.—The Eastern form of high jump. The take-off is from the outside foot. The body crosses the bar perpendicular to it.

the bar. Assuming a take-off from the left foot, he turned to the right, rather than the left, thereby reversing the usual form in landing.

The Weekly Schedule.—A suggested weekly schedule should prove helpful to the aspiring high jumper.

Monday—Jog a little, take some limbering up exercises and do the work slowly so as to recover from previous meet on preceding Saturday. Do no jumping. Practice a burst of speed to develop a pick up for a “gather” in high jumping.

Tuesday—Warm up with calisthenics and then take a moderate 330-yard run. Practice jumping. Tuesday and Wednesday should be work days. Practice some more short sprints. Work in some other field events Tuesday or Wednesday to prevent staleness. Avoid pole vaulting and broad jumping, however.

Wednesday—Another day of work. Before practice, take calisthenics and a warm-up lap. If he worked hard on Tuesday, the jumper should use Wednesday to concentrate on correction of his mistakes, using very moderate heights. The Tuesday and Wednesday procedure may be reversed according to physical condition.

Thursday—Take warm-up exercises, run moderately, but do no jumping in mid-season. A little moderate running is desirable but care should be taken not to overdo. The spring and snap in the legs must not be lost.

Friday—A shower and complete rest or a very light workout at most.

Saturday—The track meet.

THE POLE VAULT.—The pole vault is another jumping event, which can be traced back to primitive man, who used a pole to get distance, rather than height, across streams and other obstacles. As it evolved into an event for height, the contestants were really “pole climbers” until climbing was barred by the rules in 1890.

The change in the type of pole used is as interesting as the evolution of the event itself. First came the pole cut from the tree and sharpened to a point on the end. This was followed, in turn, by the pole with the iron tripod; the spiked bamboo; the hole in the ground in place of the metal tip; the wooden trough for planting the pole; and finally, a metal pole and a metal trough.

The increase in height in this event, as in many others, has been phenomenal. From the record of 9 feet 7 inches sixty years ago the height attained today approximates 15 feet, a gain of about $5\frac{1}{2}$ feet. Better run-ways and landing pits, improved poles and pole-planting

troughs, and superior techniques based on advanced knowledge of mechanics have all been factors in this development.

Equipment.—Since the hazards involved in this event can be materially reduced by proper equipment, it is important that the pole vaulter provide himself with the best possible pole, shoes, landing pit, and uprights.

The Pole.—The experience of the vaulter should help him determine whether the metal or bamboo pole is best suited to his use. Qualities which should be considered are length, uniformity of diameter, straightness, and whip. Lengths vary from 14 to 18 feet with 16 the average. Weights range from 5 pounds and 7 ounces (metal) and 5 pounds 8 ounces (bamboo) in the 14-foot poles to 6 pounds 2 ounces (metal) and 6 pounds 3 ounces (bamboo) in the 16-foot poles. Obviously, the weight of the pole should vary with the weight of the contestant. Uniformity of diameter is desirable in providing an even distribution of pole weight, thereby offering better balance. Straightness gives "whip" in all directions, and "whip" is believed by most vaulters to aid in gaining more height.

Metal poles are straighter than bamboo, are slightly lighter in weight, and are more uniform in diameter. They give more confidence, too, because they will not break. Bamboo poles, on the other hand, usually have more "whip" and are preferred by many vaulters.

The Shoes.—Most vaulters prefer a light weight, high-topped shoe of soft leather with six spikes in the sole and one in the heel. This shoe is recommended, although some contestants favor the sprint shoe which has no heel spike to catch them during the kick over the bar, and others choose a jumping shoe with two heel spikes and a rigid high counter for heel protection.

The Landing Pit.—Since the pole vaulter must fall a considerable distance after clearing the bar, it is important to have a properly constructed pit to prevent injury in landing. The minimum dimensions should be 14 by 12 feet. It should be filled with sawdust, shavings, or some other soft material to break the fall. Loose, clean sand is satisfactory to those competitors who fall on their feet, but is punishment to those who land on their side.

The Uprights.—The uprights should be placed 12 feet apart with a cross bar of uniform $1\frac{1}{8}$ -inch dimensions with leveled edges. Notched sticks long enough to seat the bar on the uprights without the use of a ladder should be provided.

Physical Characteristics.—Pole vaulters vary in build from the short type of Warne and Barnes to the large stocky type of Miller.

This is really not a heavyweight event, however. The tall athlete with powerful arms and shoulders, like Hoff and Graber, seem to predominate. Pole vaulting is the most complicated form event on the entire track and field program. It requires the arm and shoulder strength, air-mindedness, neuromuscular co-ordination, and rhythm of a circus acrobat; the spring and height of a high jumper; the endurance of a cross-country runner; and the speed of a quarter-miler. Strength in arms and shoulders for the pull-up and push-up is absolutely essential. Ability to control the body in the air, like a diver or acrobat, is also a prime requisite. Height is an advantage since it makes possible a higher grasp on the pole, thereby permitting legs and feet to swing in a greater arc and develop a more powerful centrifugal force. Spring adds to the speed of the up-swing. Great skill would be of no value in three or four hours of vaulting competition, if the contestant lacked endurance. Finally, rate of speed in the approach has much to do with success in the event. While the speed of a sprinter is probably neither necessary nor desirable, there is an ideal rate of run-up for every vaulter. Excessive speed may hinder the pole-thrust and gather for the spring and pull-up. On the other hand, sufficient speed is necessary to enable the vaulter to attain an upright position of the pole in the box.

Pole Vaulting Techniques.—If the aspiring pole vaulter has the necessary physical characteristics, he should then devote his attention to mastering the several separate techniques of the event and then mold them into one harmonious, synchronized whole. These details consist of the grip and carry, the run-up or approach, the pole-plant, the take-off, the pull-up, the clearance and push-away, and the landing.

The Grip and Carry.—Assuming that the vaulter is right-handed the position of the hand on the pole should be established as a fixed point by the height of the cross bar. Up to heights of 9 or 10 feet this grasp may be higher than the bar, between 10 and 12 feet it is about even with it, and for championship heights the grasp is considerably below the height of the bar. This spot can be determined only by experience. With the pole on the right side of the body the right hand should extend backward and grasp the pole, palm up.

The left hand should grasp the pole palm down about 36 inches below the right. The left forearm should be held across the front of the body, parallel to the ground, and at right angles to the run-way as the vaulter faces the bar. The left elbow should form a right angle.

The planting point of the pole may be carried high or low during the approach. In the *high-carry* the pole forms an angle of about 45

degrees with the ground; in the *low-carry* the pole is about level, or the point in front may be slightly lower than the back tip.

The Approach Run.—As was stated above, the approach run should be made with slightly reduced rather than with full speed. The latter would not be feasible for carrying and planting the pole, and "gathering" for the take-off. The method of determining check marks is similar to that described above for the broad jump and need not be repeated here. The vaulter may prefer a 2-6-8, a 2-8-8, or a 2-6-10 plan of striding to the take-off. (Diagram 146).

Planting the Pole and Shifting the Hands.—The pole may be planted by an overhand or an underhand thrust. Regardless of the method employed the object is the same, i.e., the pole should be dropped smoothly onto the V-shaped surface of the planting trough and slid forward into the box. (Figure 67).

The overhand thrust is performed by raising the right hand forward and upward past the head, and by *shifting the left hand* up to the right until both are fully extended. This type of thrust is usually employed with a high carry.

The underhand thrust is executed by swinging the right hand straight forward past the hip, by shifting the left hand, and then by fully extending both arms forward and upward. This type of thrust is usually employed with a low-point carry.

The shifting of the left hand should be synchronized with the planting of the pole. After the run is completed the hand spread is no longer necessary to support and carry the pole. On the contrary, it would be a handicap to the vaulter in the movements to follow. The hands should be together so both arms contribute more evenly to supporting the body weight, and to provide a more powerful pull-up and push-up. Some good vaulters use a slight hand spread, others shift the hands together, and later slide them apart again at the push-up and throw-away. This is due, ordinarily, to lack of arm strength, but mechanically it is not the recommended technique.

The pole should be planted and the hand shifted as the left foot strikes the take-off mark.

The-Take-Off.—The take-off should be made by executing a flat-footed stamp with the left foot. At impact, the knee should be slightly bent, but immediately thereafter should follow a straightening of the knee and a rock-up on the toes. While the method of executing the foot-stamp is similar to that in the broad and high jumps it is not as vicious, since the up-swing is more of a pull-up than a jump-up. Here again the force of the foot-stamp will vary with the speed of the run,

the strength of the pull-up, and perhaps other factors. It should be obvious to the vaulter that to get maximum results he should plant the foot in line with the point of the pole. If the foot were planted to

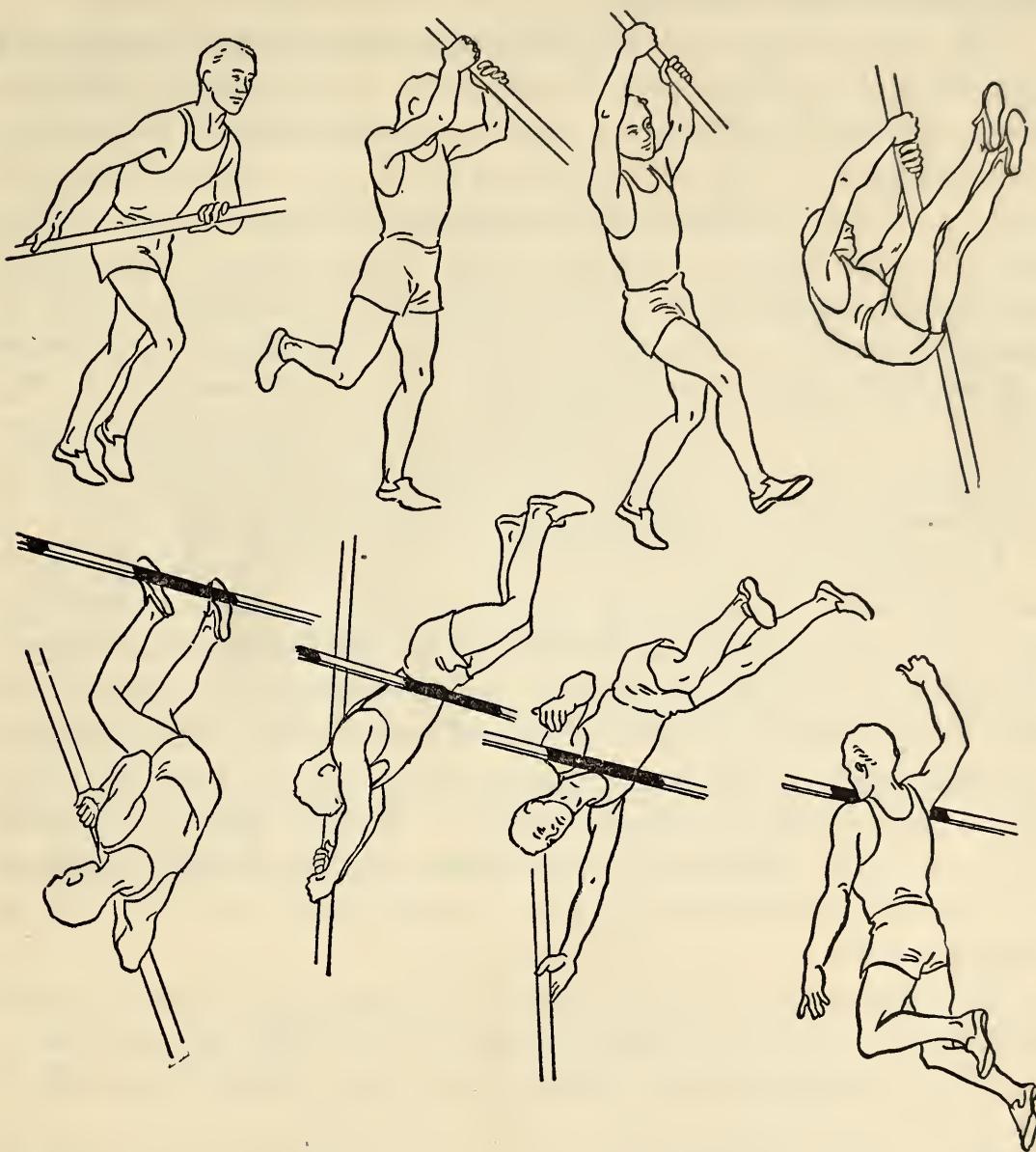


FIG. 67.—The pole vault. The upper series, left to right, shows: the approach; the plant of the pole and the take-off; the swing-up; and the pull-up. The lower series, left to right, shows: the push-up; the body turn; the jack-knife and throw-away of the pole; and the fall after clearing the bar.

the side of the pole, the up-swing would be sideward and upward, rather than directly upward.

The Swing and Pull-Up.—*The up-swing* begins after the foot and pole are planted. At the take-off the body should hang from the extended arms and swing forward-upward like a pendulum. It should swing by as close to the pole as possible. The hips should be flexed

early to shorten the radius. This is a simple mechanical principle which must be observed to increase the speed and efficiency. The hands should be extended directly over the head and the shoulders should act as the center of the pendulum.

The pull-up begins as the pole approaches a vertical position and after the hips are higher than the shoulders. This vigorous application of arm strength should follow smoothly and blend into the swing without checking or in any way impeding the forward, upward swing of the legs. The forearms should lie along the pole, and the pull is along the pole rather than at an angle with it. Hips and legs remain flexed until finally straightened. The pull-up should be equally divided between the two arms. The right leg leads the left slightly in the ascent and should be permitted to swing until somewhat above the bar. The body turn should be secured at this moment by a vigorous kick upward and outward with the left leg. This should leave the vaulter in a hand-stand position on the pole facing the landing pit. (Figure 67).

Clearing the Bar.—As the vaulter approaches maximum height, he should raise the hips by dropping the feet over the bar, until they descend to a position approximating the level of the hands on the pole. This is the so-called *jack-knife* form. He should then execute the *push-up* and *throw-away* by an upward swing of the arms and hands simultaneously, or by first releasing the left, as the body is turned, then extending and releasing the right. The arm action helps to lift the body several additional inches. Some vaulters get little jack-knife effect but they must have the arm strength to push the body high up along the pole.

The *throw-away* of the pole should be secured by a flip of the wrists and hands to prevent it from falling against the bar or standards.

The Landing.—After clearing the bar the vaulter should fall relaxed and with body extended to reduce the shock.

The vaulter must learn by experience whether the bar should be placed directly over or to either side of a perpendicular line over the planting pit. Obviously, its position will vary with the height and the wind.

The Practice Schedule.—A beginner must spend time every day in checking details, but it is very essential that an experienced vaulter do very little vaulting during the season. In fact, two days of vaulting in early season practice and one during the competitive season is enough with the competition of Saturday.

Monday—Warm up, run around the track with the pole, check the take-off run. Take a couple of 50-yard sprints.

Tuesday—Warm up, practice vaulting, concentrate on form.

Wednesday—Warm up and practice vaulting if not too stiff from Tuesday's workout. Otherwise, vault on Thursday instead.

Thursday—Warm up and work on apparatus—hand stands, horizontal bars, rings—run over a few hurdles.

Friday—Rest.

Saturday—Competition.

QUESTIONS FOR DISCUSSION

1. Why is it necessary to get height in the broad jump?
2. What is probably the most important physical characteristic of jumpers?
3. What does psychology teach regarding the methods of learning skills?
4. List the factors responsible for the lowering of records in these events.
5. What are the best present records in the jumps?
6. How should these events be officiated?
7. Attend some of the well organized meets and compare the facilities.
8. Describe the methods used in making certain the take-off will be at the right place.
9. Study pictures and athletes in competition to gain a visual picture of the action in each of the jumping events.
10. It is well to budget both time and money. It is also a good plan to budget the practice periods. How does this meet individual conditions?
11. Learn to enjoy good form in the field events as you do good times in the track events.
12. Make a check list of important details of this chapter.

TEST QUESTIONS

- | | |
|-----|--|
| T F | 1. The running broad jump has been an event in track and field competition in the United States for about seventy years. |
| T F | 2. The broad jumper should strike the board flat-footed with the take-off foot. |
| T F | 3. The center of gravity of the broad jumper should be directly over the take-off foot at the moment he leaves the board. |
| T F | 4. If the center of gravity of the broad jumper is directly over the take-off foot at the moment he leaves the board, the tendency will be to jump upward, rather than forward and upward. |
| T F | 5. In broad jumping the last stride before the take-off should be lengthened. |
| T F | 6. As the take-off foot strikes the board in broad jumping the knee should be slightly bent as a part of the "gather" for the spring. |
| T F | 7. During the hitch-kick or walk-in-the-air motion of the broad jump the body should be almost erect. |
| T F | 8. In preparation for landing in the broad jump the body should be inclined backward to add reach to the legs. |

- T F 9. As the take-off leg is extended forcefully backward in broad jumping the opposite arm should swing vigorously forward.
- T F 10. The broad jump is made from a 4 by 8 by 48-inch board.
- T F 11. Running speed is of paramount importance in high jumping.
- T F 12. The scissors method of high jumping is inefficient because it does not include a lay-out in crossing the bar.
- T F 13. The take-off for the Western Roll form in high jumping is executed from the outside foot.
- T F 14. The take-off foot in high jumping should be slapped down on the ground in a flat-footed position.
- T F 15. The kick-up of the free leg in high jumping should be started with a bent rather than a straight knee.
- T F 16. In high jumping, the center of gravity should be directly over the take-off foot at the moment of take-off.
- T F 17. As the right or free leg swings forward and upward in high jumping the left arm should swing in the same direction.
- T F 18. The body of the Western Roll high jumper will be parallel to the bar as he crosses it, while that of the Eastern style jumper will be approximately perpendicular to it.
- T F 19. The Eastern style high jumper takes off with his outside foot.
- T F 20. The Western Roll jumper approaches the bar at right angles while the Eastern style jumper approaches it at an angle of 45 degrees.
- T F 21. In the early days of the pole vault event the contestants were really "pole climbers."
- T F 22. Metal vaulting poles of aluminum alloy are lighter than bamboo poles of corresponding length.
- T F 23. For championship heights approximating 14 feet a right handed pole vaulter should grip the pole with his right hand 14 feet from the planting point.
- T F 24. In the *high-carry position* the pole forms an angle of about 45 degrees with the ground.
- T F 25. The pole vaulter should run at full speed toward the bar to obtain maximum height.
- T F 26. A right handed pole vaulter should synchronize the shifting of the left hand with the planting of the pole.
- T F 27. The pole should be planted as the take-off foot strikes the ground.
- T F 28. The pull-up in pole vaulting begins after the hips are higher than the shoulders.
- T F 29. During the pull-up the pole vaulter should flex the hips to shorten the radius and increase the speed.
- T F 30. During the swing-up the hands, rather than the shoulders, should serve as the center of the pendulum.



Keystone (FPG)

Shot putting technique. This shows how the shot is held; the position of the right wrist, elbow and arm; the action of the left arm; the body bend; the weight distribution; and the leg spread preparatory to the shift across the circle. (Jack Torrance)



Keystone (FPG)

The reverse and follow through in the shot put. (John Lyman)



Keystone (FPG)

The position preliminary to throwing the discus.



Keystone (FPG)

Throwing the discus. Note the grip of the discus, the leg action in the turn across the circle, and the action of the shoulder in leading the arm and discus in the turn.



Photo by C. E. Kemp for "Pic" (FPG)

The release of the javelin. Note how the arm comes through directly over the shoulder and exactly in the plane of the throw.

CHAPTER 7

PEOPLE LIKE TO THROW OBJECTS

Throwing is a fundamental activity which was common in primitive times and is still popular today. Every boy at some time has doubtless found pleasure in testing his prowess in throwing stones, spears, and darts and in putting or shoving rocks from the shoulders. The track and field program as well as practically all games, includes the element of throwing in its program. The three most common events are the discus and javelin throws, and the shot put.

THE SHOT PUT.—The shot put event evolved from the “running rock put.” The stone used in earlier days was shaped like a block and weighed 14 pounds. The running approach produced great distances, which are not possible with the 16-pound or even the high school 12-pound sphere, under the modern restrictions of the 7-foot circle.

Physical Characteristics.—The shot put is strictly a heavy-weight event. Height, weight, and strength are all essential for championship distance. Speed of muscle contraction is also a vital factor in success. Torrance of Louisiana was 6 feet 4 inches tall and weighed about 250 pounds. A majority of the shot putters are around 200 pounds in weight.

Shot Putting Technique.—Shot putting technique consists of the hold, the stance and leg swing, the shift, the reverse, and the put.

Holding the Shot.—A right-handed putter should pick up the shot with the left hand to avoid tiring the putting hand and take his place in the back of the circle. The sphere should then be transferred to the right hand and held at the *base* of the first three fingers. The little finger may be bent along the side to give lateral support or it also may be placed back of the shot to add force to the put. If the contestant has large and unusually strong hands, or after the muscles of the fingers and hand have been sufficiently developed, he may wish to carry the sphere higher on the fingers.

The Stance and Leg Swing.—The right-handed putter should stand in the back of the circle and face at right angles with the direction of the put. The outside edge of the right foot should be placed close to the back edge of the circle with the left 10 to 15 inches toward

the front of the circle. The distance and direction from the right is a matter of individual preference. (Figure 68).

The shot should be carried somewhat above and behind the point of the shoulder. If carried too close to the ear, a common mechanical principle is violated, since this position will reduce the *distance* through which the propelling force is applied. The elbow should be raised and held away from the body. The right forearm should point in the direction of the put. The left arm and hand should be extended forward and upward in the direction of the put to maintain balance.

The right leg, with the knee slightly bent, should support the body weight. The left leg should be swung in several backward and for-



FIG. 68.—A series of correct form in the shot put.

ward movements preliminary to the shift. These swinging movements may be along the side of the right leg and at right angles to the direction of the put, or they may be in front of, or behind, the right leg and parallel with the direction of the put. Here again the form chosen should rest with the contestant.

The Shift.—The shift should start at the back of the leg swing so the forward swing of the leg will add momentum to it. As this left leg reaches its most forward point the right thigh, leg and foot should be forcefully extended. The left arm should assist, too, by swinging backward at the beginning of the shift and upward with it. These movements will start the shot putter rapidly across the circle. All possible speed should be obtained in crossing the circle. He must be careful to glide close to the ground rather than jump into the air.

With the shot maintaining its original position the contestant moves both feet in a glide, which lands him with the left foot within a few inches of the front of the circle and with feet about 3 feet apart. The right foot traverses about two-fifths of the distance across the circle.

Most putters land on the right a fraction of a second before the left foot strikes the ground. Some men, however, move and plant them at the same time.

Upon landing the contestant should "gather" for the put. The weight should be supported by the right foot with both knees flexed. The right shoulder should be drawn back and the right hip dropped, preparatory to the reverse.

The Reverse.—The shift should be followed by the reverse, or quick interchange of feet, without a pause. The right leg should be extended vigorously as the trunk is twisted to the left. At the same time, the right arm should be pushed forcefully forward and upward with the left arm swinging backward and downward. The right foot should land near, or even against, the front of the circle, and point to the left of the direction of the put. The left leg should swing backward and sideward.

The Put.—The shot should be released by a final wrist and finger snap which will add materially to the distance of the put. This action provides a slight backward turn of the sphere. The best angle for the release of the missile is approximately 40 degrees.

The head should be held in the position at the finish which seems most natural and which feels most comfortable. Care should be taken not to step out of the circle.

One of the most common mistakes in shot putting is the "loss of control" of the weight as the right arm is pushed forward and the release is made. The tendency is to throw the ball or allow it to get out of the plane of the application of power. This is a serious fault and inevitably results in a very poor put.

The Practice Schedule.—Field men are likely to regard training and conditioning as unimportant. But if strength is to be acquired the rules of hygiene and exercise must be observed. Hours of practice are required to learn the above techniques so they may be performed gracefully. It is wise, during early training to practice the glide across the circle without the shot, and conversely, it is desirable to put without the glide.

The Weekly Schedule:

Monday—10 minutes of calisthenics, 20 minutes of light putting for form, and some work with the sprinters.

Tuesday—10 minutes of calisthenics, 20 or more puts for form, and some work with the jumpers and sprinters.

Wednesday—Putting for distance. Quit before the arm gets tired.

Thursday—Light work for form.

Friday—Rest.

Saturday—The meet.

THE DISCUS THROW.—The discus throw has been a popular event since the days of Greece, where it was a feature of the ancient Olympic Games. The Greek style is represented by the famous statue, Discobolus, throwing from a pedestal. The modern free style, allowing the throw from a 7-foot circle, was introduced in the late nineties. Since then the diameter of the circle has been increased to 8 feet $2\frac{1}{2}$ inches. From a throw of about 118 feet in the nineties, the distance has been increased approximately 60 feet in 40 years.

Physical Characteristics.—Discus throwers, like shot putters, are usually large men. Jessup of Washington was about 6 feet 7 inches tall. In addition to height, weight, and strength this event requires a large strong hand for proper grasp of the discus. A long arm is an advantage, too, since it makes possible the swing of the discus through a greater arc, thereby gaining greater velocity at the release. Strength of legs, arms, and shoulders, co-ordination, rhythm, and speed of muscle contraction are all important factors in attaining championship distances.

The Technique of Discus Throwing.—The technique of throwing the discus involves a sequence of skills which include the grip, the initial stance, the swings, the pivots across the circle, and the throw and reverse.

The Grip.—The discus should be placed flat against the palm of the hand with the edge held by the first joint of each finger. The latter are evenly spread to cover as much surface as possible and the thumb should be extended in a straight line with the forearm to add balance. In this type of grip the major portion of the hand is behind the center of weight of the discus.

The beginner should practice “sailing” the discus until he finds the most comfortable grip. That is, he should try releasing it off his index finger causing it to spin in a *clock-wise rotation*. After he has learned to grip and release it properly he should next assume the initial stance.

The Initial Stance.—The discus thrower’s initial stance in the circle is similar to that of the shot putter. This means that he should stand in the back of the circle, with feet comfortably spread from 16 to 24 inches and toes pointing at right angles to and resting on a line parallel with the direction of the throw. The trunk should be nearly erect, with the weight evenly distributed between the feet, and the

knees should be bent. The amount of knee flexion varies with contestants. After taking this stance the thrower should begin the preparatory swings. (Figure 69).

The Preparatory Swings.—Most competitors take several preparatory swings which serve as a “wind-up” to add impetus to the body turn. They consist of backward and forward movements of the arm, preliminary to the start across the circle. When the arm and hand

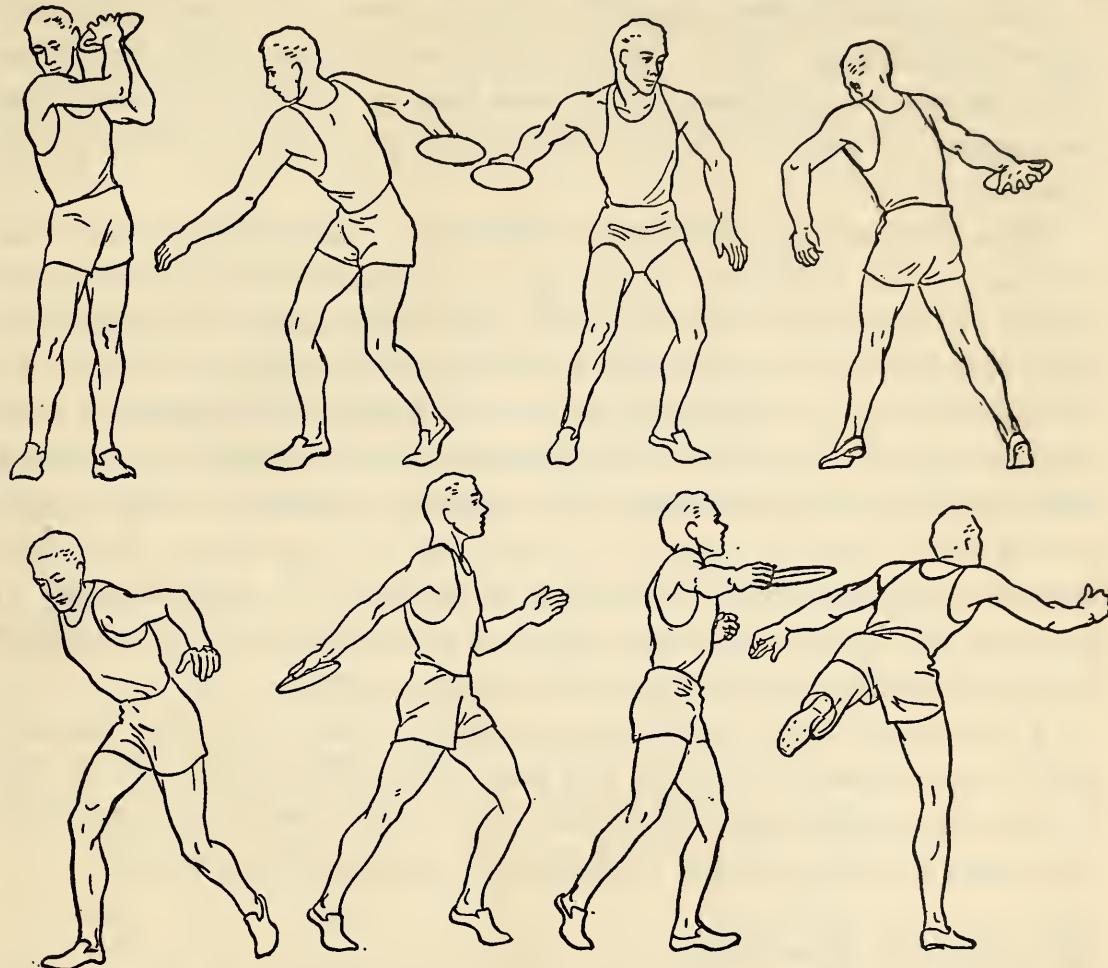


FIG. 69.—The discus throw. The upper series, from left to right, shows the initial stance, and the start of the turn or pivot. The lower series, from left to right, shows the completion of the turn, the throw, and the follow-through.

reach the back point in the last swing, the discus thrower is ready to begin the pivots.

The Pivots Across the Circle.—As the right arm swings back, assuming a right-handed thrower, the weight should be shifted to the right foot, with the left touching the ground lightly to assist in maintaining balance. The left arm should be extended in the opposite direction from the right and swing in synchronized fashion with it. With the right arm fully extended backward, the thrower should turn the body sharply to the left, dragging or pulling the shoulder, arm, and

discus around with it. With the weight shifted to the left foot a half turn should be made by pivoting on it. The turn should be continued by shifting the weight back again to the right foot and pivoting around to the left on it. The pivot steps should be taken on a direct line in the direction of the throw. As the turn is completed the left foot should be placed on the ground near the front of the circle so that both feet are firmly planted for the throwing effort. (Figure 69).

Some discus throwers employ what is known as the *jump and pivot* style of crossing the circle. With the feet somewhat closer together in the initial stance, a jump is made from both feet. This is followed by a complete turn of the body and a landing on the two feet simultaneously.

The Throw and Reverse.—With one continuous and harmonious motion, the contestant should go from the pivot into the throwing action. In a final forceful effort, the right leg should be extended, the body should be turned sharply to the left, the right arm should be “whipped” in the same direction, and the wrist should impart a final snap or spin to the missile. The thrower should straighten up from a moderate knee bend position at the moment of release. The weight should shift from the right to the left leg and the discus should be thrown from about shoulder height at an angle of approximately 30 degrees. While the arm and body turn counter-clockwise, the platter is released off the index finger with a clockwise spin.

To maintain body balance and remain in the circle the thrower should quickly reverse his feet as a part of the follow-through. As this is done the weight should shift back to the right foot while the left leg and arm swing around and back to assist in maintaining balance.

The Weekly Practice:

Monday—A long workout on form without trying for distance, following a complete warm-up.

Tuesday—Warm up. Work one and one-half hours on throwing. It is well to split up the movements and not spend all the time on throws. All but the last six throws should be for form.

Wednesday—Warm up. Spend time with the sprinters and jumpers. Some time should also be spent in hurdling.

Thursday—Warm up. This is another form day with about five throws for distance. In all these practice periods for form, pay particular attention to the footwork and fouling.

Friday—Rest.

Saturday—Complete warm up. Competition.

THE JAVELIN THROW.—Modern javelin throwing evolved from the spear throwing of the ancients. By attaching a thong, or leather strap, near the center of weight, the spear was a deadly weapon, which could be hurled for long distances with great accuracy.

Even though man has been throwing spears for ages, the modern javelin throw is a comparatively recent innovation on the track and field program. At the Olympic Games in 1906, Lemning of Sweden threw the javelin 175 feet 6 inches. This was responsible for the introduction of the event into the United States. The rapid improvement in technique and increase in distance is indicated by the recent throw of 243 feet 10½ inches by Jarvinen of Finland. The Finns, incidentally, seem to excel in this event with a result that their form of training routine and physical characteristics are of great interest to American coaches and contestants.

Physical Characteristics.—While men of various types of physical builds have succeeded in this event the strong, tall athlete has a decided advantage. A powerful throwing arm, and strong leg and back muscles are paramount in importance. Speed, too, is desirable, especially if the thrower can transfer it effectively into force in releasing the javelin.

The Javelin.—The official javelin prescribed by international rules must be made of *wood* such as hickory, ash or birch, with a metal point. The *metal* javelin is permitted in the United States under the joint rules of the National Collegiate Athletic Association and the National Federation of State High School Athletic Associations. The length is approximately 8½ feet, with a whip cord binding near the center of gravity. The weight should be not less than 1.765 (800 grams) lbs. Exact specifications may be found in the Official Rules. The javelin should be straight and somewhat resilient. The shaft may be thick or thin to suit the desires of the contestant. Likewise, the cord binding may be moved up or down along the shaft within a range of about 8 inches to vary the center of balance.

Wooden javelins should be hung in a cool, moderately dry place for storage by suspending them from the points.

The Technique of Javelin Throwing.—The javelin throw consists of a series of skills including the grip, the carry, the run, the cross or hop-step, and the throw and reverse.

The Grip.—The *Finnish grip* is the most commonly employed method of grasping the javelin. It consists of grasping the shaft at the rear edge of the cord binding with the *thumb* and *second finger*. The first finger should extend along and somewhat around the shaft, while

the second and third grip around the binding. This method permits the javelin to rest in the groove of the palm of the hand and the angle formed between the shaft and the forearm is relatively small.

Although the above method is recommended some contestants prefer the so-called *American grip*. It differs from the Finnish, since it consists of grasping the shaft at the rear edge of the cord binding with the thumb and *first finger*. This requires the thrower to hold the shaft at a greater angle to the forearm.

The Carry.—There are three common methods of carrying the javelin during the run. The first is known as the *front carry with the point down*. It is quite generally used by the Finns and is, therefore, one of the most popular carrys. A second method is called the *over-the-shoulder carry with the point up*. It is common among contestants, who employ the hop-step form. A third method is known as the *underarm carry with the point up* and is commonly employed by the rear-cross-step style of throwers.

The Approach Run.—The length of the average run is approximately 105 feet. The method of locating check marks is similar to that described for the broad jump. The first mark should be made 5 strides, or around 30 feet, from the take-off board. Eight strides farther out the second mark should be made. A few strides, 4 or 5, still farther out depending on individual preferences should be placed the third check mark. The run should start from here and the left foot should strike the second check mark. The action of the arms, including the carry arm, should be synchronized, in so far as possible, with the leg action.

The Finnish Front Cross-Step.—After the thrower's left foot strikes the first check mark thirty feet out from the take-off, he will need five steps to complete the throw and land on the right foot near the board (Diagram 148). At one, the right foot should strike the ground straight forward, and at the same time, the right arm should be raised to bring the point of the javelin level with the shoulder. At two, the left foot should strike with the toes pointing slightly to the right. At this moment the arm should start straight back to the throwing position. At three, the right foot should be thrown across in front of the left. It should strike the ground with the toes pointing parallel with the take-off board. At four, the left foot should be planted with a moderate spread of the legs, and at the same time the right arm should draw the javelin all the way back preparatory to the throw. The latter should be started with a powerful thrust from a bent right leg. The right hip should thrust forward, and the body should turn viciously to

face the direction of the throw. The strong muscles below the shoulder exert a tremendous force in thrusting the torso forward. The elbow should advance ahead of the hand so that the javelin is brought forward high over the head. Bending the body and head forward and to the left brings the javelin along in the proper plane. The throw is finished off the left foot. At the count of five the right foot should come forward with a semi-reverse and land with the toes parallel to the take-

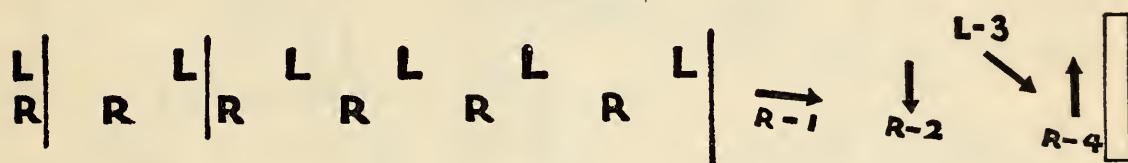
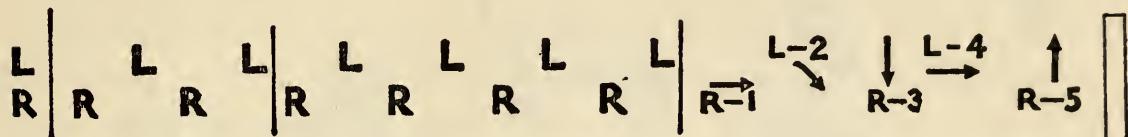


DIAGRAM 148.—The strides and check marks in the approach run for the javelin throw: the Finnish Front Cross Step (above); the Hop-Step (middle); and the Rear Cross Step (below).

off board and pointing to the left of the direction of the throw or directly opposite to their previous position. This front cross-step enables the thrower to get more speed on the run and more weight of the body into the throw. The javelin should be whipped with a flick of the wrist as it leaves the hand. (Figure 70).

Although some throwers still carry the javelin with an extended arm behind the body and below the shoulder, a majority of them have adopted the carry-over-the-shoulder method described above. It is difficult to run at full speed with the arm extended behind the body. An out-fielder in baseball would hamper his speed materially if he fully extended his arms while running to make the catch. He uses

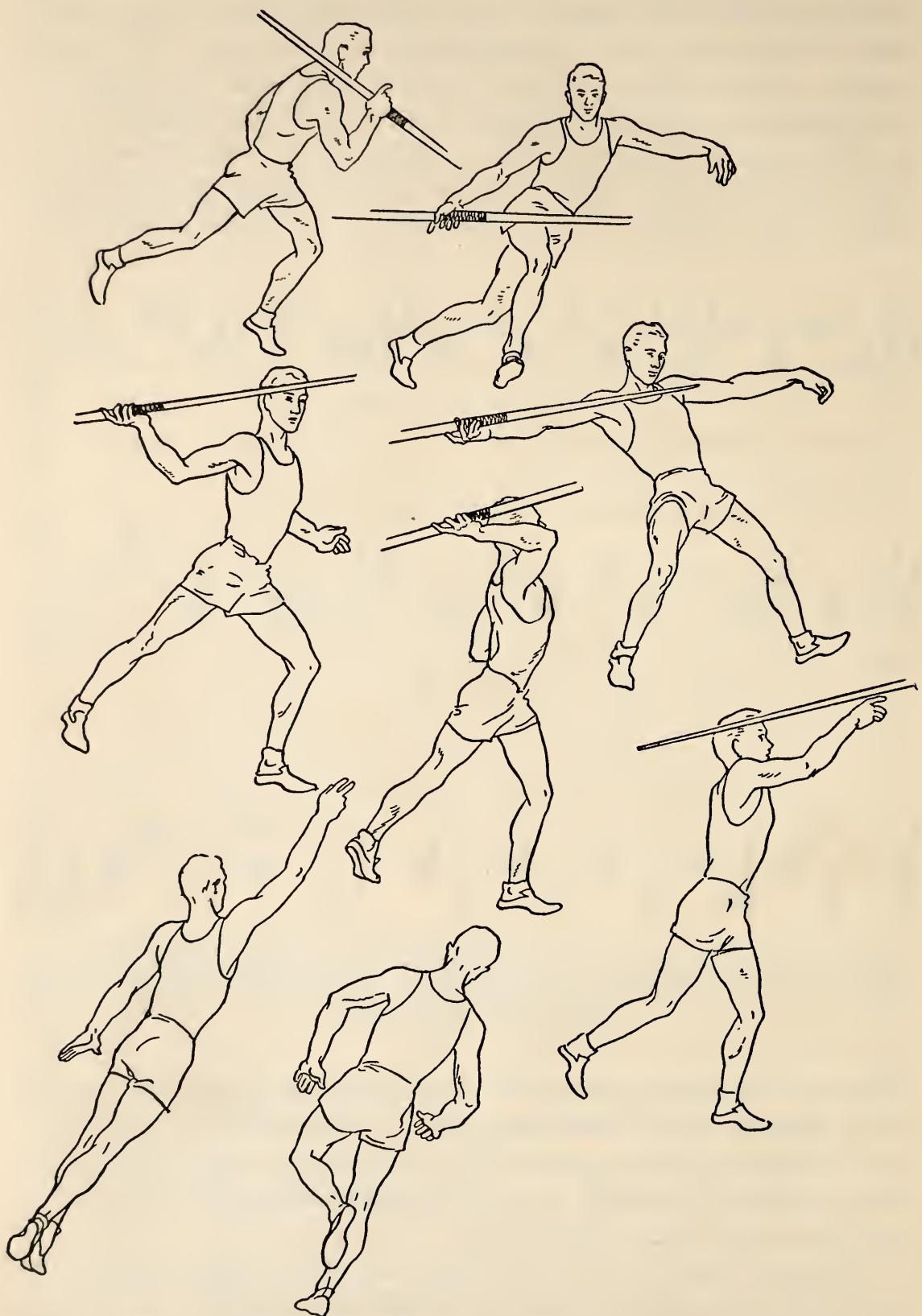


FIG. 70.—The javelin throw showing the form quite generally used by the Finns. Note the Finnish front carry (upper left), and the Finnish front cross-step (upper right).

both arms as a sprinter and reaches out just at the moment he makes the catch. In the Finnish carry the javelin thrower can use his arms much like a sprinter and still carry the javelin.

The Rear Cross-Step.—There are other types of footwork which are quite popular. The Finnish front cross step has been described, but many coaches use the rear cross step (Diagram 148). In this method, at about fifteen feet before the scratch line is reached, the left foot should be pointed to the right. The right foot should move forward, but behind and in a position to the left of the left foot. As it is planted it should point to the right and parallel to the board. As the left foot steps again the throwing stance is acquired. The throw is made off the right leg and foot as the latter lands with the toes facing the throw.

The Hop-Step.—The third method is the hop-step (Diagram 148). In this style the right foot strikes the ground pointing toward the throw. The hop is then made from this foot so that the toes point to the right. When the left leg lands forward with the toes also pointing right the throwing stance is acquired.

The Throw and Reverse.—On the step preceding the release, and as the right foot strikes the ground, the body is inclined far backward. It is then inclined sharply forward to add speed to the forward motion of the run. The long sweep and whip of the throwing arm and the snap of the wrist both add further to the speed with which the javelin is released. The latter should be thrown forward and upward at an angle of approximately 35 degrees with the ground. The arm should come forward with an over-the-shoulder rather than a sidearm swing with the elbow leading the hand until the final extension.

The Training Schedule:

Monday—Jog a half-mile, 15 minutes of calisthenics, work with sprinters and jumpers.

Tuesday—Throw for form after a good warm up. Give particular attention to the check marks, timing, and relaxation on the throw.

Wednesday—Same as Tuesday.

Thursday—Same as Monday.

Friday—Rest.

Saturday—Competition.

It is well to have the javelin thrower work on other events to keep an edge for keen competition without excessive throwing. He must care for his throwing arm, his legs, and his general bodily condition as religiously as the baseball pitcher.

QUESTIONS FOR DISCUSSION

1. What are the throwing events of the track and field program?
2. Name a few factors common to all these events.
3. If not a competitor, learn the facilities necessary to conduct these events and the methods of measuring the throws. You are sure to be called upon to officiate these events sooner or later.
4. What are the movements necessary to get the shot away to a good put?
5. What is the footwork necessary in the three throwing events?
6. What are the fundamental movements common to these events? Summarize these so they can be remembered without too much effort.
7. What is the purpose of the reverse in throwing?
8. How valuable is the warm-up in the field events?
9. Learn the present records so you will know a good performance when you see one.
10. Summarize training schedules.

TEST QUESTIONS

- | | | |
|---|---|--|
| T | F | 1. The shot should be held in the base of the first three fingers. |
| T | F | 2. In the initial stance the shot putter should stand in the back of the circle and face in the direction of the put. |
| T | F | 3. The shot putter should jump rather than glide across the circle. |
| T | F | 4. The shot putter should cross the circle with all possible speed. |
| T | F | 5. The angle of release of the shot should be approximately 30 degrees. |
| T | F | 6. The discus should be released off the index finger with a clockwise spin. |
| T | F | 7. In throwing the discus the pivot steps across the circle should be taken on a direct line with the direction of the throw. |
| T | F | 8. After the pivots and body turn the discus thrower should hesitate momentarily before releasing the missile. |
| T | F | 9. The discus should be released at an angle of approximately 45 degrees. |
| T | F | 10. The right shoulder of the right handed discus thrower should precede the arm, hand, and discus and "pull" them around during the body turn. |
| T | F | 11. The Finnish method of grasping the javelin consists of gripping the shaft at the rear edge of the cord binding with the <i>thumb</i> and <i>second</i> finger. |
| T | F | 12. The American method of grasping the javelin consists of gripping the shaft at the rear edge of the cord binding with the <i>thumb</i> and <i>first</i> finger. |
| T | F | 13. The <i>front carry with the point down</i> is the method generally employed by Finnish javelin throwers. |
| T | F | 14. The <i>front cross step</i> employed by a right handed thrower is made with the left foot. |
| T | F | 15. The javelin should be released at an angle of approximately 35 degrees. |

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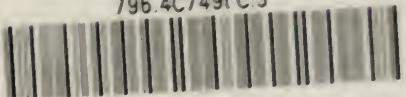
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